COMPARISON OF VARIOUS DISEASE ACTIVITY INDICES IN RHEUMATOID ARTHRITIS

A THESIS SUBMITTED TO

BABA FARID UNIVERSITY OF HEALTH SCIENCES, FARIDKOT (PUNJAB)

IN THE PARTIAL FULFILLMENT

FOR THE AWARD OF DEGREE OF

DOCTOR OF MEDICINE

IN

GENERAL MEDICINE

MAY 2022

Submitted By

DR. RAVREET PAL KAUR

DEPARTMENT OF GENERAL MEDICINE
DAYANAND MEDICAL COLLEGE AND HOSPITAL
LUDHIANA, PUNJAB

DECLARATION BY THE CANDIDATE

I hereby declare that the thesis entitled "**COMPARISON OF VARIOUS DISEASE ACTIVITY INDICES IN RHEUMATOID ARTHRITIS**" submitted towards partial fulfillment of the requirements for the award of **MD in Medicine** degree to BFUHS is a compilation of original work carried out by me under the supervision of **Dr. Sandeep Puri**, Principal & Professor, Department of Medicine, & **Dr. Vipin Kumar**, Associate Professor, Department of Medicine. No part of this thesis has formed the basis for the award of any degree previously.

_____

DR. RAVREET PAL KAUR
Department of Medicine,
Dayanand Medical College & Hospital,
Ludhiana, Punjab

Date:

Place:

CERTIFICATE OF SUPERVISORS

This is to certify that the work incorporated in this thesis entitled "**COMPARISON OF VARIOUS DISEASE ACTIVITY INDICES IN RHEUMATOID ARTHRITIS"** has been carried out by **Dr. Ravreet Pal Kaur** under our direct supervision. The data incorporated in this thesis is original and genuine and has been carried out by the candidate herself.

Signature of Supervisor

Dr. Sandeep Puri
Principal & Professor
Department of Medicine
DMC&H, Ludhiana

Signature of Co-Supervisors

Dr. Vipin Kumar
Associate Professor
Department of Medicine
DMC&H, Ludhiana

Date:

ENDORSEMENT BY THE HEAD OF THE INSTITUTE

This is to certify that the thesis entitled "**COMPARISON OF VARIOUS DISEASE ACTIVITY INDICES IN RHEUMATOID ARTHRITIS"** is a bonafide research work done by **Dr. Ravreet Pal Kaur** under the supervision of **Dr. Sandeep Puri**, Principal & Professor, Department of Medicine, & **Dr. Vipin Kumar**, Associate Professor, Department of Medicine in this institution.

Principal

Dr. Sandeep Puri
Principal
DMC&H, Ludhiana

Date:

COPYRIGHT

Declaration by the Candidate

I hereby declare that the Baba Farid University of Heath Sciences, Faridkot, shall have the rights to preserve & use this thesis in print or electronic format for academic/study purpose by the research scholar/students.

Signature

Dr. Ravreet Pal Kaur
Department of Medicine,
Dayanand Medical College & Hospital,
Ludhiana, Punjab

Date:

© Baba Farid University of Health Sciences, Faridkot

Dedicated

to

my Family

&

Teachers

ACKNOWLEDGEMENT

With the blessings of the Almighty, I would like to express my sincere gratitude for all the support and guidance I received while carrying out the study.

First and foremost, I wish to convey my profound gratitude to my revered teacher and supervisor, Dr. Sandeep Puri, Principal and Professor, Department of Medicine, Dayanand Medical College and Hospital, Ludhiana for his constant guidance and bonafide support not only during the thesis work but right from the undergraduate days. His endless patience, expert advice, everlasting encouragement and unending help made it possible for me to carry out my study overcoming all the hurdles. Sir, I am humbled to get an opportunity to carry out the study under your affectionate supervision.

I wish to express my sincere thanks to my co-supervisor Dr Vipin Kumar, Associate Professor, Department of Medicine, Dayanand Medical College and Hospital, Ludhiana for his illustrious guidance and support. His constant encouragement always motivated me.

I owe a special gratitude to Dr. Vikas Gupta, Associate Professor, Department of Rheumatology and Immunology, Dayanand Medical College and Hospital, Ludhiana for his never ending help and support through out the study. His valuable teaching and scholarly suggestions made the task much more simple. An opportunity to learn from him has been one of the special experience that the thesis provided.

I, would also like to thank, Dr. Dinesh Gupta, Professor and Head, Department of Medicine, Dayanand Medical College and Hospital, Ludhiana for extending his unfeigned guidance and support.

I, also wish to thank Dr. Sandeep Kaushal, Dean Academics, Dayanand Medical College and Hospital, Ludhiana for always being there for all my doubts and meticulous advice for aptly conducting my study.

I, wish to thank my sister, Dr Avneet Pal Kaur, who constantly supervised and encouraged me throughout the study. This thesis would not have been possible without the constant support and

inspiration from my loving parents Mr Gurnam Singh and Mrs Satwant Kaur, whose blessings always shower on me.

I would like to extend my sincere gratitude to Mr. Naveen Bhatia, Research and development center, for all his patience and guidance from the very beginning. I would like to thank Mrs. Namita Bansal, for helping me every single time.

I extend appreciation for all the motivation and guidance I received from my wonderful seniors, colleagues and friends.

I wish to extend warm regards to the staff and patients for their cooperation.

At last, I would like to thank all those who helped me to accomplish this task.

Dr. Ravreet Pal Kaur

LIST OF ABBREVIATIONS

ACCP	Anti-cyclic citrullinated peptide antibody
ACR/EULAR	American college of Rheumatology/European League Against Rheumatism
BIOLOGICs	Genetically engineered biological agents
CDAI	Clinical disease activity index
CMC	Carpometacarpal joint
COVID	Coronavirus Disease
CRP	C - Reactive Protein
DAS 28	Disease activity score 28
DMARDs	Disease Modifying Anti Rheumatic Drugs
DMC	Dayanand Medical College and Hospital
ESR	Erythrocyte Sedimentation Rate
EGA	Evaluator's Global Assessment
HCQ	Hydroxychloroquine
HLA	Human Leucocyte Antigen
IL-6	Interleukin-6
LEF	Leflunomide
MHC	Major Histocompatibilty Complex
MicroRNA	Micro Ribonucleic acid
MTP	Metatarsophalangeal joint
MTX	Methotrexate
NSAIDs	Non steroidal anti inflammatory drugs
NSIP	Non specific interstitial pneumonia
OPD	Out Patient Department

PRO	Patient reported outcome
PGA	Patient's Global Assessment
RA	Rheumatoid arthritis
RADAI-5	Rheumatoid arthritis disease activity index- 5
RAPID 3	Routine assessment of patient index data 3
RAPS	Rheumatoid arthritis pain scale
RF	Rheumatiod Factor
SJC	Swollen Joint Count
SSZ	Sulfasalazine
TJC	Tender Joint Count
TNF –α	Tumor necrosis factor – alpha
UIP	Usual interstitial pneumonia
VAS	Visual analogue scale
WHO	World health organization
α	Cronbach's alpha
ρ (rho) or r	Spearman's correlation coefficient
κ	Cohen's Kappa

ABSTRACT

Introduction: Rheumatoid arthritis (RA) is a chronic inflammatory disease with high prevalence. Regular disease activity assessment forms cornerstone in treating RA, which can be done using conventional indices of DAS28 and CDAI or newer indices of RADAI-5 and RAPID-3.

Aim of Study: 1) To study the correlation and concordance of RAPID 3 and RADAI-5 with DAS28 and CDAI 2) To validate RADAI-5 in Punjabi language for use in Indian Punjabi population.

Materials & Methods: This cross sectional prospective study enrolled OPD patients of RA. RADAI-5 was translated in Punjabi language using standard protocol and validated amongst 45 patients enrolled in first 2 months of the study. Then 200 RA patients completed proformas and their DAS 28, CDAI, RAPID3 and RADAI-5 (Punjabi version) scores were obtained. Results interpreted using statistical analysis of Cronbach's alpha (α), spearman correlation coefficient (ρ) and Cohen's kappa coefficient (κ).

Results: Punjabi version of RADAI-5 has feasibility, reliability and validity with **α=** 0.745 and significant criterion correlation to DAS28 and CDAI, thus validated for use. When applied to 200 patients, Punjabi version of RADAI-5 had very strong significant correlation with DAS 28 and CDAI (ρ =0.868 and 0.869, both at $p<0.0001$) with fair level of agreement with both DAS 28 (κ =0.391, p=0.0001) and CDAI (κ= 0.391, p=0.006). RAPID3 also had very strong significant correlation with DAS28 and CDAI (ρ =0.862 and 0.906, both at $p<0.0001$) with moderate level of agreement with DAS 28 (κ =0.46,$p<0.0001$) and slight but statistically significant agreement with CDAI (κ =0.157, $p <0.0001$)

Conclusion: Punjabi version of RADAI-5 is valid for use in Indian Punjabi population. RADAI-5 and RAPID3 have strong and statistically significant correlation as well as agreement/concordance with both DAS28 and CDAI. Thus RADAI-5 and RAPID3 are clinically relevant disease activity indices which do not require formal joint count or blood investigations and hence suited for used in busy OPD especially in resource limited setting and overburdened health care infrastructure.

Keywords: RAPID 3, RADAI-5, DAS28, CDAI, RA.

TABLE OF CONTENTS

S. NO.	TOPIC	PAGES
I	INTRODUCTION	1-11
II	AIMS AND OBJECTIVES	12
III	REVIEW OF LITERATURE	13-29
IV	MATERIALS AND METHODS	30-37
V	OBSERVATIONS AND RESULTS	38-72
VI	DISCUSSION	73-85
VII	SUMMARY AND CONCLUSIONS	86-87
VIII	BIBLIOGRAPHY	88-99

APPENDICES – I

- PROFORMA
- MASTER CHART

APPENDICES – II

- APPROVAL LETTER OF THESIS PLAN
- THESIS PLAN
- CERTIFICATE OF FORWARD TRANSLATION
- CERTIFICATE OF BACKWARD TRANSLATION
- DATA FOR VALIDATION OF PUNJABI VERSION OF RADAI-5
- LICENSE AGREEMENT FOR USING RAPID3

LIST OF TABLES

Table No.	Title	Page No.
1.	Extra- Articular Manifestations In RA	7
2.	2010 ACR/EULAR classification criteria of RA	8
3.	RA disease activity based on DAS 28 score	15
4.	RA disease activity based on CDAI score	17
5.	RA disease activity based on RADAI-5 score	18
6.	RA disease severity based on RAPID 3 score	22
7.	Interpretation of Spearman's correlation coefficient value	36
8.	Interpretation of Kappa statistics by guidelines of Landis and Koch	36
9.	Mean score for five questions of Punjabi version of RADAI-5 for validation study	39
10.	Cronbach's alpha obtained for Punjabi version of RADAI-5 (for validation phase of study)	39
11.	Criterion validity parameters for evaluating Punjabi version of RADAI-5 (validation phase of study)	41
12.	Construct validity parameters of Punjabi version of RADAI-5 (validation phase of study)	43
13.	Gender distribution in the study	45
14.	Age distribution in the study	46
15.	Education level of various study subjects	47
16.	Disease duration distribution in the study	48
17.	Seropositivity distribution in the study	49
18.	Frequency of smokers in the study	50
19.	Distribution of positive family history in study	51
20.	Coexistinent comorbidities in patients of the study	52
21.	Number of patients with deformity in the study	54
22.	Various extra-articular manifestations seen and their frequency	55
23.	Incidence of anemia in RA patients	57

24.	Distribution of cases as per DAS-28 disease activity score	58
25.	Distribution of cases as per CDAI disease activity score	59
26.	Distribution of cases as per RADAI-5 disease activity score	60
27.	Distribution of cases as per RAPID-3 disease severity score	61
28.	Spearman's correlation coefficient of RADAI-5 and RAPID-3 with DAS-28 and CDAI	62
29.	Agreement and kappa statistics between RADAI-5 and DAS-28	65
30.	Agreement and kappa statistics between RADAI-5 and CDAI	67
31.	Agreement and kappa statistics between RAPID-3 and DAS-28	69
32.	Agreement and kappa statistics between RAPID-3 and CDAI	71

LIST OF FIGURES

Fig. No.	Title	Page No.
1.	Pathogenesis of RA	2
2.	Picture showing hand deformities	5
3.	Types of DMARDs available for treating RA	11
4.	Flow chart depicting the study methodology	37
5	Frequency distribution Punjabi version of RADAI-5 score in 45 patients for validation study	40
6a	Graph showing correlation of Punjabi version of RADAI-5 with DAS28 for Criterion validity (validation phase of study)	42
6b	Graph showing correlation of Punjabi version of RADAI-5 and CDAI for Criterion validity (validation phase of study)	42
7.	Gender distribution in the study	45
8.	Age distribution in the study	46
9.	Education level of various study subjects	47
10.	Disease duration distribution in the study	48
11.	Distribution of study subject according to serology	49
12.	Frequency of smokers in the study	50
13.	Study subjects with positive family history of RA	51
14.	Coexistent comorbidities in patients of the study	53
15.	Percentage of patients with deformities in the study	54
16.	Number of patients with rheumatoid nodule	56
17.	Number of patients with ILD	56
18.	Number of patients with Secondary Sjogren	56
19.	Number of patients with neuropathy	56
20.	Number of patients with vasculitis	56
21.	Number of patients with skin involvement	56
22.	Distribution of anemia in patients of the study	57
23	Distribution of cases as per DAS-28 disease activity score	58
24	Distribution of cases as per CDAI disease activity score	59
25	Distribution of cases as per RADAI-5 disease activity score	60

26	Distribution of cases as per RAPID3 disease severity score	61
27	Correlation of RADAI-5 with DAS-28	63
28	Correlation of RADAI-5 with CDAI	63
29	Correlation of RAPID-3 with DAS-28	64
30	Correlation of RAPID-3 with CDAI	64
31	Agreement between RADAI-5 and DAS28 categories of RA disease activity	66
32	Agreement between RADAI-5 and CDAI categories of RA disease activity	68
33	Agreement between RAPID3 and DAS28 categories of RA disease severity/activity	70
34	Agreement between RAPID3 and CDAI categories of RA disease severity/activity	72

INTRODUCTION

RA is a chronic multisystem inflammatory disease with autoimmune pathogenesis. It manifests with both articular and extra-articular features and impacts the daily quality of living of numerous patients suffering from this treatable yet incurable disease. It classically affects the small joints of hands and is bilaterally symmetrical and has a rapidly progressive and fluctuating course, which if treated early and appropriately could prevent permanent deformities and upgrade the overall quality of living of the person. This is possible due to advent of various DMARDs and BIOLOGICs. Treating RA early and aptly not only decreases morbidity but can also prevent complications like premature atherosclerosis[1] and cardiovascular disease and hence can impact cardiovascular co-morbidity and mortality.[2]

RA is the most common form of inflammatory arthritis.[3]The vast variety of symptoms of RA makes it a disease encountered by different medical specialities in daily practice.[4] It has a substantial effect on society in terms of cost, disability and lost productivity.[3] Thus timely diagnosis, regular assessment of disease activity and treatment of RA becomes of immense importance in the long run. Due to the benefit of early recognition and treatment, there has been increased research going on for the early phase of disease. Newer classification criteria have been developed. Also the outcome measures have evolved over the course of time, with more focus being laid on sustained drug-free remission and patient-reported outcomes.

EPIDEMIOLOGY: RA affects about 1% of the global population [5] according to WHO and it affects about 0.75% of adult population in India.[6] There is slight difference between incidence and prevalence according to the geographic location. It has been observed that prevalence in North America and Europe may be higher than prevalence in Asia.[7-8] Whether this difference exists due to genetic/environmental difference or due to

study design differences is yet to be evaluated.[9] The prevalence of RA is about 4-5 times higher in females than males below the age of 50, but above 60-70 years age the female to male ratio is only about 2.[10]

PATHOGENESIS : RA is mediated by a complex interaction of various factors - genetic ,non genetic/ environmental factors, mechanisms of the innate and adaptive immune system , autoimmunity, close interaction between genetic factors and epigenetic mechanisms, B and T cells, cytokines, complement activation, and formation of invasive synovium/pannus. However, there are still several aspects of the disease that need further investigation. [11]

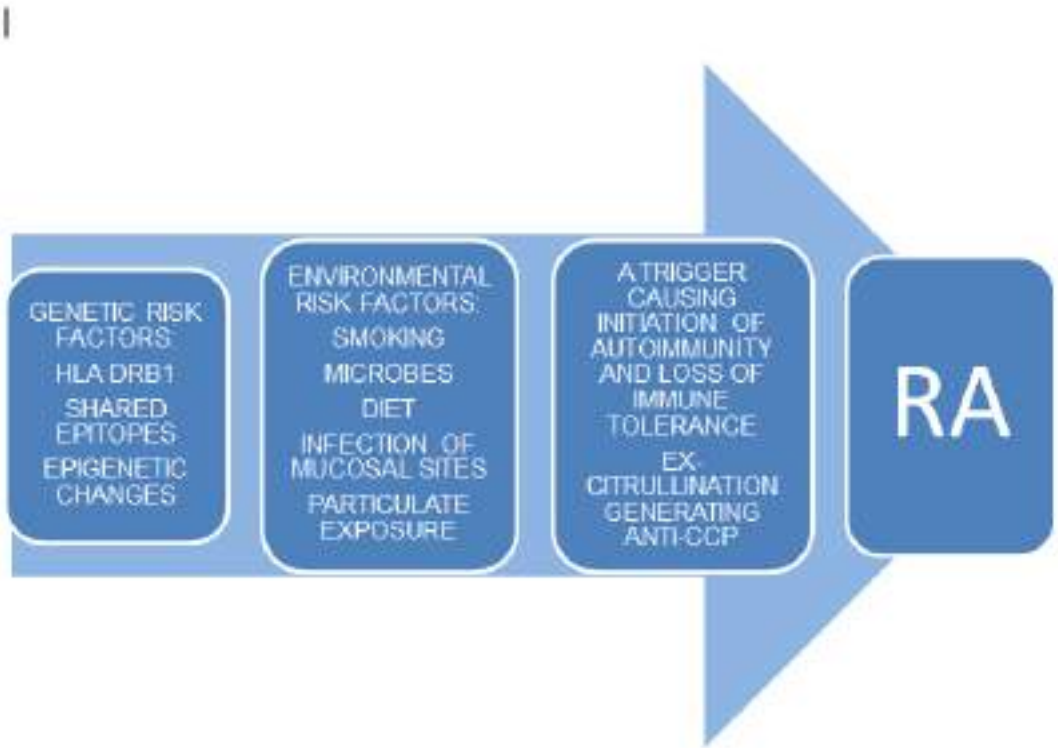

Figure 1 – Pathogenesis of RA

The initiation of RA begins with a combination of genetic susceptibility with factors like environmental stimuli or epigenetic modifications.[12]

The most important genetic risk factor for RA development, the shared epitope alleles, resides in the MHC class II region. Shared epitope alleles, however, only predispose to the development of seropositive RA. MHC class II loci which encode MHC molecules HLA-DRB1*01 and HLA-DRB1*04 display a very strong association with RA.[12,13] There is a significant inheritance of familial genetic risk factors accounting ≥ 50% of the total risk of developing seropositive RA, with the highest incidence rates being among first-degree relatives.[12]

The most important environmental risk factor associated with the development of RA is smoking.[12] Other environmental risk factors include - particulate exposure, periodontal disease, bronchiectasis, diet, obesity, the oral contraceptive impact, infection of respiratory, oral, intestinal and genital tract mucosal sites.[12]

The inflammatory process usually develops in a predisposed individual who is probably exposed to a provocative trigger of autoimmunity via epigenetic modifications. A number of risk factors, genetic as well non genetic elements lay down the hostile environment for the change towards autoimmunity. Neo-epitopes are formed via citrullination process in which post translational conversion of the amino acid arginine to citrulline takes place in both intracellular proteins and matrix proteins via deamination.

The altered peptides bind to MHC protein heterodimers on antigen presenting cells (dendritic cells and macrophages) which then stimulate T lymphocyte activation and differentiation. Over 100 non-HLA genetic risk factors (loci) have been associated with an increased risk of developing RA.[13,14]The activated T lymphocyte release numerous pro-inflammatory cytokines and stimulate B cells which form specific antibodies against the neo-epitopes perpetuating an autoimmune response. In addition to

autoantibody production the activated B lymphocytes release IL-6.[13, 14] This stimulates fibroblast-like synoviocytes, antigen presenting cells and macrophages within the synovial joints to release a cascade of pro-inflammatory mediators like prostaglandins, leukotrienes, microRNAs, TNF-α, interleukins and chemokines causing cartilage and bone damage. Chronic autoimmune inflammation of synovial membranes leads to development of cellular pannus. Memory T cells either diffusely infiltrate the synovial tissue or form ectopic germinal centers(15-20% cases) in which mature B cells proliferate, differentiate and produce autoantibodies (RF and ACCP).[15-16] Persistent inflammation through its complex mechanisms results in many systemic and extra-articular manifestations, resulting in severe comorbidities such as rheumatoid lung, carditis, vasculitis, cachexia, anemia, increased atherosclerosis, cardiovascular and cerebrovascular disease, lymphoma, osteoporosis, depression etc. These complications and comorbidities together result in handicap, social dysfunction and premature death. [17]

CLINICAL FEATURES

Rheumatoid arthritis can be sub-classified into seropositive and seronegative RA on the basis of presence/absence of RF and/or ACPA. Out of these two, ACPA are highly specific for RA, whereas RF can also be found among healthy (elderly) individuals and patients with other autoimmune diseases or infection. ACPA, RF and high CRP levels can be present in some patients years before onset of clinical symptoms. Patients can present with articular and/or extra-articular manifestations.

ARTICULAR AND PERI-ARTICULAR MANIFESTATIONS:

RA can manifest as joint pain, swelling and tenderness to palpation, with morning stiffness and severe motion impairment in the involved joints. It usually involves the metacarpophalangeal joints, proximal interphalangeal joints, metatarsophalangeal joints, wrist and knee joint. It typically is symmetric and erosive in nature. Although any joint, including the

cricoarytenoid joint, can be affected, the distal interphalangeal, the sacroiliac, and the lumbar spine joints are rarely involved.[18] Sometimes very late in the disease course in an undiagnosed/untreated patient the clinician can reach the diagnosis just by looking at the characteristic deformities like swan neck, boutonniere's deformity, Z thumb deformity and ulnar deviation. The deformities can be disabling and patients with HLA-DR1 or HLA-DR4 have increased risk of developing severe deformities if not treated.[19] Its onset can be acute, subacute or palindromic. RA can have monoarticular presentation (both slow and acute forms), extra-articular synovitis (tenosynovitis, bursitis), polymyalgic-like onset, and general symptoms (malaise, fatigue, weight loss, fever).

Figure 2 - Picture showing hand deformities in patient number 135 (V.K.), swan neck deformity of 2nd and 3rd finger and boutonniere's deformity of 4th and 5th finger

EXTRA-ARTICULAR MANIFESTATIONS:

Involvement of extra-articular organs and musculoskeletal system other than joints occurs in approximately 40 % of RA patients. [20] These occur more commonly in seropositive patients, in early disability and in smokers.[21] Extra-articular manifestations in RA also signify increased severity of disease, overall morbidity and premature mortality.[22]

Rheumatoid nodule-

Rheumatoid nodules are the most common extra-articular feature, found in about 30% of patients.[23] They are firm, non tender present in skin or subcutaneous tissue. They occur on periarticular structure and are common on pressure points like olecranon process, but can occur anywhere including pleura, lungs and meninges

Sjogren syndrome-

Secondary Sjögren's syndrome is also a common extra-articular manifestation and occurs early in the disease course.[23]

Coronary artery disease-

Recent findings indicate that cardiac death is increased in RA patients when compared with subjects without arthritis as the inflammatory process may contribute to premature atherosclerosis.[24]

Interstitial lung disease-

Interstitial lung disease (ILD) accounts for the major cause of morbidity and mortality in rheumatoid arthritis (RA). It can present as UIP or NSIP or even other forms. DMARDs in RA lack strong evidence for the onset or worsening of ILD.[25]

Anemia-

Usually normocytic normochromic type of anemia is present in most RA patients. Its etiology is multifactorial. It correlates with the degree of disease activity and it has been seen that if the anemia is successfully treated, the joint disease will likely respond to treatment as well.[26]

Constitutional signs/symptoms:

Fatigue, fibromyalgia, weight loss, psychiatric disease especially depression are also seen in RA. It has been observed that depression is highly prevalent in RA and associated with poorer RA outcomes.[27] Altered body composition with sarcopenia also affects the quality of life in RA patients.[28]

The extra-articular manifestations are a major diagnostic and therapeutic challenge, since these are associated with a poor prognosis and need to be recognized early and appropriately managed.[23]

Table 1 - Extra-articular manifestations in RA [29]

Organ system involved in RA	**Extra-articular manifestation seen**
Skin	Rheumatoid nodules, ulcers, cutaneous vasculitis, leukocytoclastic vasculitis, raynaud's phenomenon, palmar erythema
Pleuropulmonary	Pleuritis, pleural effusion, lung nodules, interstitial lung disease, small airway disease
Eyes	Scleritis, episcleritis, secondary sjogren syndrome
Cardiovascular	Atherosclerosis, myocardial infarction, pericarditis, arrhythmias, valvular heart disease
Neurological	Entrapment neuropathy, mononeuritis multiplex, cervical subluxation
Hematological	Felty's syndrome, large granular lymphocyte syndrome, anemia, thrombocytosis
Renal	Glomerulonephritis, secondary amyloidosis
Vascular	Vasculitis
Musculoskeletal	Osteoporosis, tendon/ligament rupture

DIAGNOSIS

RA is mainly a clinical diagnosis. The diagnosis of RA is based on its cardinal symptoms of involvement of 3 or more small joint in the form of pain, swelling, morning stiffness lasting more than 30 minutes, raised ESR, CRP, ANTI-CCP, RF and joint swelling/ tenderness. For prompt diagnosis and treatment EULAR/ACR ran a collaborative plan to revise

the 1987 ACR criteria for classification of RA in 2010.[30] This criteria is now known as 2010 ACR/EULAR classification criteria for RA and is followed worldwide. This criteria has been validated to be sensitive to detect cases of RA among various target populations, especially early in the course of disease.[31]

Table 2 – 2010 ACR/EULAR classification criteria of RA	
CRITERIA	**SCORE**
A. JOINT INVOLVEMENT	
1 large joint (Shoulder/Elbow/Knee/Ankle)	0
2-10 large joints	1
1-3 small joints (large joints not counted)	2
4-10 small joints (large joints not counted)	3
>10 joints (at least one small joint)	5
B. SEROLOGY (at least 1 test)	
Negative RF and negative ACPA	0
Low-positive RF or low-positive ACPA (≤3times)	2
High-positive RF or high-positive ACPA (>3times)	3
C. ACUTE PHASE REACTANTS (at least 1 test)	
Normal CRP and normal ESR	0
Abnormal CRP or abnormal ESR	1
D. DURATION OF SYMPTOMS	
<6 weeks	0
≥6 weeks	1

The final score is obtained by adding the individual values.

If the total score is ≥ 6 out of 10, the patient is said to meet the classification criteria of RA and hence the patient is diagnosed with RA.

Joint involvement - refers to any joint with swelling or tenderness on examination that indicates active synovitis. Here, the DIP joints, the first MTP joint and the first CMC joint should not be considered, as they are commonly involved in osteoarthritis.[31]

ASSESSMENT OF DISEASE SEVERITY

Regular and timely assessment of disease activity forms a cornerstone in appropriate treatment strategy for Rheumatoid arthritis and various indices[32] have been developed and improvised for the same. About 63 [33] or more RA disease activity measuring tools have been formulated. Few have gained more importance than others. Some of them are -

- DAS 28 (ESR or CRP based): Disease activity score - 28 joint.
- CDAI: Clinical disease activity score.
- RAPID 3: Routine assessment of patient index data 3.
- RAPID 5: Routine assessment of patient index data 5.
- RADAI-5: Rheumatoid arthritis disease activity index-5.
- DASH: Disability of arm, shoulder and hand.
- Quick DASH: Abbreviated version of Disability of arm, shoulder and hand.
- PRO-CLARA: Clinical Arthritis Activity Index using only three PRO measures.
- BRAF: Bristol rheumatoid arthritis fatigue score.
- FACIT-F: Functional assessment of chronic illness therapy-fatigue.
- PAIN VAS: Pain- visual analog score.
- RAID: Rheumatoid arthritis impact of disease.
- PAS II: Patient activity scale II.

In most of the cases it is not always possible to carry out full fledged 28 joint examination for TJC, SJC or to get a value of ESR at each visit, which is must for DAS-28 and CDAI scores. Relatively newer scales RADAI-5 and RAPID3 offer advantage of no requirement of TJC, SJC and ESR. Additionally being based upon self evaluation by patient, these indices could also be of more help in COVID pandemic times. There are only few studies of Indian setup which aimed at evaluating the newer scales. Thus we conducted this study to evaluate RADAI-5 and RAPID 3 in comparison to DAS 28 and CDAI.

TREATMENT

Prompt diagnosis and treatment to quickly control the ongoing active inflammation and the underlying disease process forms the cornerstone of adequate disease management and modification of its outcome. Over the course of time, approach to treat RA has evolved. Emphasis is now laid on early introduction of DMARDs (disease modifying anti rheumatic drugs)[34] rather than NSAIDs and glucocorticoids. Now focus is on closely following the patient to timely diagnose a flare, quantify its severity using various indices and thereby treat accordingly. The goal is to achieve and maintain disease remission/low disease activity at well tolerated doses of DMARDs/other agents in order to prevent drug toxicities and improve the quality of life of a patient suffering from RA. There has been trend towards following a new approach called “treat to target”.[35] It is based upon strict disease control strategy. This strategy includes regular disease activity assessment and quantification. To cater to this need, various new score and indices have been developed to simplify and improve the process of disease severity assessment. The treat to target approach is thought to result in better outcome for the patients. Since RA involves multiple organ systems, and impacts and individual not only physically but also psychologically, emotionally and socially, its therapy should include psychosocial interventions, physical and occupational therapy, management of its extra-articular manifestations and complications and vigilantly monitoring for the side effects of drugs used in treating RA.

Also the RA therapy should be based on a shared decision between patient and rheumatologist for better adherence to the treatment and hence better outcomes.[36]

Various treatment options for RA are as follows-

NSAIDs- for symptomatic relief.

Corticosteroids- to control inflammation in a flare.

DMARDs - they are the main stay of treatment.[37]

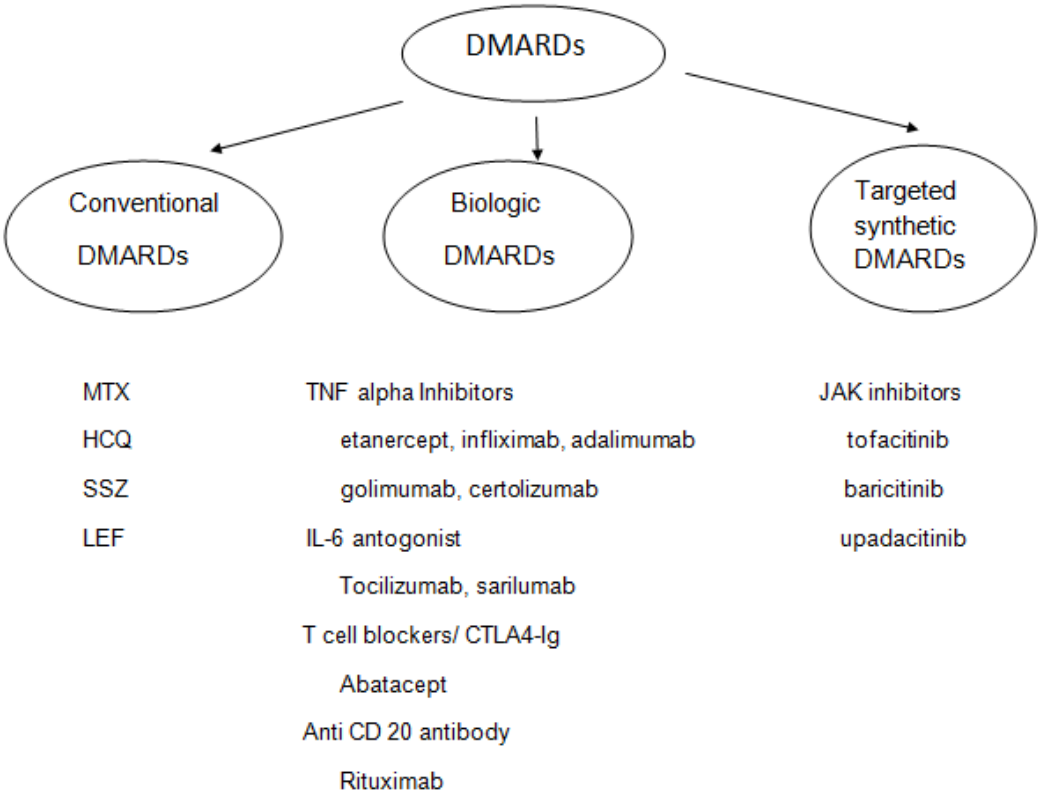

Figure 3: Types of DMARDs available for treating RA

Surgical intervention- One of the last treatment resort. Arthroplasty, arthrodesis, synovectomy, tendon release, etc can be done to improve daily functioning and decrease pain or reduce deformity.

AIMS & OBJECTIVES

- To study the correlation and concordance of RAPID 3 and RADAI-5 with DAS28 and CDAI.
- To validate RADAI-5 in Punjabi language for use in Indian Punjabi population.

REVIEW OF LITERATURE

RA has a natural course comprising of relapses/flares and remission. Quick assessment tools are required which have the potential to identify a flare and thus help the physician to modify the treatment plan for best possible outcomes. Similarly, classifying a patient in remission requires these methods. Also the upcoming strategy of treat to target[35] in RA requires measures to assess the disease activity promptly. Treat to target plan is based on setting a pre-fixed target and directing the treatment to achieve that target. The therapeutic target in RA should be achieving a state of remission, or a low disease activity. Hence, clinician should be able to measure and record disease activity in every clinical visit so that if the goal has not been reached upon, timely therapeutic adjustments could be made to achieve the target. Current available literature shows that this strategy has significant clinical benefits in patients with early RA when compared with routine care.[38] Thus there is increasing need for disease activity measuring indices in RA. The composite index chosen should, therefore, be applicable to the circumstance in which it will be used and clinically appropriate. The best benefit for the patient can thus be obtained by combining the optimal treatment protocol with the most appropriate outcome measure index/disease severity index.[39]

This current study is based upon evaluation of indices which would be more appropriate for outcome measure, clinically relevant and feasible than the conventional indices requiring formal joint count.

Numerous indices[32,33] have been formulated and improved for this purpose and are also being widely used. Also newer indices are being developed in the search of clinically most relevant index in given circumstances.

- Indices developed to measure Disease Activity include :
  DAS 28 (ESR and CRP based)
  CDAI
  SDAI
  RAPID 3
  RAPID 5
  RADAI-5
  PRO-CLARA
- Indices developed to measure fatigue include :
  BRAF
  FACIT-F
- Indices developed to measure pain include :
  RAPS
  PAIN VAS
- Indices developed to measure Disease Impact include :
  RAID
  DASH
  QuickDASH

DAS 28:-

It is one of the earliest index developed for disease activity monitoring and has been in use worldwide since a long time. Two types of DAS 28 index are commonly used, namely DAS28–ESR and DAS28-CRP. DAS 28 usually denotes DAS 28-ESR score.

DAS 28-ESR = $0.56\sqrt{TJC} + 0.28\sqrt{SJC} + 0.70 Ln\ ESR + 0.014\ GH$

DAS 28-CRP = $0.96 + (0.56\sqrt{TJC}) + (0.28\sqrt{SJC}) + (0.36 Ln\ (CRP+1)) + 0.014 GH$

Where GH or Global Health represents the patient's assessment of general health on VAS scale ranging from 0-100, where 100 means maximal activity.

This score is based upon the clinician examining 28 joints including both shoulders, elbows, wrists, metacarpophalangeal joints, proximal interphalangeal joints and knee joints. The original DAS score included 44 joints and was developed in 1990 and modified to DAS 28 in 1995.[40] DAS 28 using CRP instead of ESR was developed on 2003.[41] Additional versions of DAS 28 excluding GH have also been developed[42] based on 3 or 4 variables like DAS 28-3v-ESR, DAS 28-3v-CRP, DAS28-4v-ESR and DAS28-4v-CRP.

DAS 28 ranges from 0 – 9.4.[42] Based upon its value, activity of RA is assessed as follows

Table 3 – RA disease activity based on DAS 28 score

Level of disease activity of RA	**DAS-28 score**
REMISSION	0 to <2.6
LOW	2.6to 3.2
MODERATE	>3.2 to 5.1
SEVERE	>5.1

Van Gestel AM et al[43] conducted a study on validation of the European League Against Rheumatism response criteria for rheumatoid arthritis in 1996 and inferred that a reduction in DAS 28 score of more than 1.2 represents a major improvement. Also EULAR response criteria classify patients as good, moderate, or non responders, based upon both the change in DAS and level of DAS reached. Good responders have an improvement in DAS >1.2 and follow up DAS ≤2.4; non responders have improvement in DAS ≤0.6 or improvement >0.6 but ≤1.2 and follow up DAS >3.7; rest all are classified as moderate responders.

Jaap Fransen et al[44] in a study of 2001 reported the predictive ability of DAS 28 score to differentiate between active and inactive RA to be 0.88.

Despite the advantages and appreciable accuracy of this scale, this scale was shown to be time consuming in a study by Jaclyn K. Anderson et al.[42] The time is consumed for formal joint assessment and count. Also it takes time for the labs to provide the value of ESR. Apart from this, application of this scale adds to administrative burden as a trained physician is needed for adequate joint examination. Since it involves complex mathematical calculation, instant results require a programmed calculator or computer. Though DAS 28 is considered the “gold standard” to measure disease activity in RA and is already being used worldwide, these slight complexities pave in the need for other indices which could be more easier and quicker to administer. Being the gold standard, majority of the new indices are compared to DAS 28.

CDAI: -

Clinical disease activity index is one of the other disease activity index that is being used worldwide. It was developed by Daniel Aletaha, MD, et al, in Austria in 2005.[42]

.

CDAI = SJC + TJC + PGA + EGA

Where

PGA= patient’s disease global assessment on a VAS scale 0 – 10 cm.

EGA= evaluator’s disease global assessment on a VAS scale 0 – 10 cm.

SJC = swollen joint count.

TJC = tender joint count.

RA disease activity on basis of CDAI index as per ACR guidelines, is classified as follows.[45]

Table 4 - RA disease activity based on CDAI score	
Disease activity	**CDAI value**
Remission	0 to 2.8
Low	>2.8 to 10
Moderate	>10 to 22
High	>22

A cross-sectional study, was conducted at Pt. BDS PGIMS, Rohtak by Harpreet singh et al,[46] in 2011 to evaluate disease activity in Rheumatoid Arthritis patients using Clinical Disease Activity Index (CDAI) in 200 patients in which DAS 28 and CDAI scores were calculated for each of the 200 patients at every clinic visit and then these two indices were compared amongst themselves. The study concluded that CDAI has a moderate-to-good correlation with the DAS-28 scale for disease activity assessment in RA patients with kappa value = 0.533; p value < 0.0001. This study also emphasized some benefits of CDAI like its a relatively simple composite index which can be computed by simple numeric addition of four clinical parameters, rather than a complex formula and hence CDAI is easy to use in daily clinical practice. It does not require any lab investigations for its calculation. Hence concluded CDAI as a useful index in day to day clinical practice. One drawback of the CDAI reported by Anderson JK et al[42] in a study on various measures of rheumatoid arthritis disease activity was that not all physicians perform detailed joint examinations while assessing disease activity in patients of RA. Hence, there was need for other disease activity indices which did not require formal joint count for scoring severity of RA.

RADAI-5:

Rheumatoid arthritis disease activity index 5 is a newly developed disease activity index which is entirely assessed by patient. This index was developed by Dr Burkhard F. Leeb, Austria. It comprises 5 questions to be answered on a ordered category scale ranging from 0 to 10.[42] These questions assess for global disease activity in last 6 months, current disease activity in terms of joint tenderness and swelling, pain due to RA, general health and duration of morning stiffness in respective order.

RADAI-5 score = (Q1 + Q2 + Q3 + Q4 + Q5)/ 5

Where Q1 = score of question item 1(ranging from 0 – 10, with 10 indicating the worst assessment by the patient) and so on.

The total score ranges from 0 - 10

In a study conducted by Rintelen B et al (47) 392 patients of RA were evaluated by DAS28, CDAI, RADAI-5 and patient satisfaction with disease status. Based on this they proposed disease activity categories according to RADAI-5 scale. These 392 patients underwent 758 assessments i.e. median of 2 assessments per patient during the study. It categorized RADAI-5 as follows:

Table 5 - RA disease activity based on RADAI-5 score

Disease activity	**RADAI-5 score**
Remission	0.0 to 1.4
Mild	1.6 to 3.0
Moderate	3.2 to 5.4
Severe	5.6 to 10.0

They also concluded that this patient self-report questionnaire can substitute composite disease activity scores in routine patient care and practice.

The inventor Leeb Bukhard along with others[48] conducted a study on 169 OPD patients to study the psychometric properties and validity of RADAI-5 and hence check its utility for use in comparison to other indices. They concluded that value of Cronbach's alpha was highest for the RADAI-5 score i.e. 0.917. Also, RADAI-5 was highly significantly correlated (all $p < 0.0001$) to DAS 28 ESR, DAS 28 CRP, CDAI, and SDAI. They also found out that the changes of the RADAI-5, DAS28-ESR, and CDAI were significantly correlated ($p < 0.001$). The additional benefit of using this score as suggested by the founder was that RADAI-5 is a patient self-administered activity assessment tool and does not require the presence of a physician for calculation of its value. It hardly takes 20–30 seconds to get the RADAI-5 value in contrast to 2–3 minutes for CDAI value, and 3–5 minutes for DAS28 value and does not include any laboratory tests and therefore all parameters are available at point of care in the clinic, which results in prompt assessment. Thus it can produce more consistency in timing and completeness of disease measurement across the world. Apart from the founder, the advantages and efficacy of this new scale was also confirmed in various other studies.

Shereen R. Kamel, et al[49] in a study on 40 patients concluded that RADAI-5 was significantly correlating with DAS 28 with pearson coefficient value of 0.9 and $p<0.001$, Also it was found that RADAI-5 was significantly correlating with quality of life scale, pain scale (100 mm visual analog pain scale), and functional status. Also RADAI-5 was found to be significantly correlating with morning stiffness duration.

RADAI-5 was studied by Harpreet Singh, et al[50] and the authors concluded that RADAI-5 was significantly correlated to DAS28 and CDAI with spearman coefficient value of 0.862 ($p<0.001$) and 0.856 ($p<0.001$) respectively. Also there was correlation between classification of severity according to RADAI-5 when compared to classification by DAS 28 and CDAI, with a higher degree of classification correlation with DAS 28 than

with CDAI, with the agreement being higher in category of moderate – high disease activity.

In another study Leeb BF[48,51] et al inferred that since RADAI-5 is patient reported index, it has potential to offer perspective for a more individualized patient monitoring. As individualized treatment is becoming increasingly important, patient-related outcome tools like RADAI-5 could provide advantage of identifying patients that require particular attention and hence individualizing monitoring.

Another study was conducted amongst 100 RA patients by Vikram S Tanwar et al[52] in 2019 to study the utility and validity of RADAI5 in comparison to DAS28 and CDAI. In this study each patient was assessed twice for DAS28, CDAI and RADAI5 in a 3 month interval and indices compared amongst themselves for the final outcome. It was found that at both the assessments, RADAI-5 was significantly correlating with DAS28-ESR based, CDAI, and core data set measures - all having spearman correlation coefficient of >0.5 with p value<0.001. Kappa value of RADAI-5 with DAS28 and CDAI at baseline and 3 month follow up were 0.563, 0.411, 0.595 and 0.574 respectively (all with p value <0.001). Thus proving an average statistically significant agreement level of RADAI-5 with DAS28 and CDAI.

This score was further tested in a cross sectional study of 200 patients by Marrie Bossert et al.[53] It also tested the other self reported questionnaire - RAPID3. Both of these were compared to DAS28, CDAI and SDAI by pairwise compution of spearman coefficient, kappa coefficient and receiver-operating characteristic curve (ROC). Not only RADAI-5 scores but RAPID3 scores were concluded to be correlated significantly to the three composite activity indices i.e. DAS28, CDAI and SDAI, with ρ values ranging from 0.64 to 0.74. The flare detection rate was 35 % according to the patient and 22% according to the physician, which signifies moderate agreement between them with kappa value = 0.44.

Further, Ishmihan Sunar et al[54] translated and validated RADAI5 in their native Turkish language and proved its reliability and proved strong correlation of its Turkish translation to DAS28 score.

The results of various studies were concordant and also suggest that RADAI-5 is highly reliable, acceptable, and sensitive for assessment of any improvement or deterioration in RA disease activity. It is quick and easy to administer and does not require formal joint evaluation or any blood tests. Thus, favoring the use of RADAI-5 for routine clinical settings as well as home-based settings.

RAPID 3:

Routine assessment of patient index data 3 is another self-report questionnaire based index that was developed by Theodore Pincus, MD in New York. It is based upon 3 patient-reported ACR RA Core Data Set measures[55] namely physical function, pain, and patient global estimate of status. Each of the 3 individual measures is scored 0 to 10, for a total of 30. Physical function is further assessed in RAPID3 by a subset of 10 mandatory questions pertaining to routine daily tasks and the ability of the patient to perform those tasks over the last one week with no, some or much difficulty or unable to carry out the task asked. After the patient assigns the level of difficulty faced for each task, the score of each subset question is added, the value obtained is simplified to a reduced form using a conversion table provided along with this questionnaire. This gives us the score for first question pertaining to function, ranging from 0 to 10. Patient is then asked to weigh pain and self global health assessment over score of 0 to 10 each. The final Rapid3 score is then computed by adding the scores for these three patient reported core data set measures. Based upon RAPID3 score, the severity of RA is interpreted as follows: [55]

Table 6 - RA disease severity based on RAPID 3 score	
Disease activity of RA	**RAPID 3 SCORE**
Remission	< or = 3
Low	3.1 to 6
Moderate	6.1 to 12
High	>12

In another study by T. Pincus, et al.[56] conducted in 285 patient, it was concluded that RAPID 3 score were correlated significantly with DAS 28 and CDAI with spearman value >0.65 at p<0.001. Also 78-84% of study population who were classified as moderate/high disease activity according to DAS28 or CDAI criteria were also classified similarly according to RAPID3 criteria.

An advantage of RAPID 3 reported by Pincus T, et al[57] is that RAPID 3 can be scored in 5 to 10 seconds as compared to 108 seconds for CDAI and 114 seconds for DAS 28.

Muñoz JGB et al[58] conducted a study in Colombia amongst 119 patients fulfilling the 1987 ACR criteria of RA to assess the correlation between RAPID-3, DAS28, CDAI and SDAI. The mean age of this study population was 61 ± 13.8 years ,mean disease duration was 14 years and 77% were females. The RAPID3, DAS28, CDAI, SDAI and MDHAQ were recorded for each patient. A strong correlation was obtained with all the other indices, between RAPID-3 and DAS 28 (r value=0.719 at p < 0.001), between RAPID-3 and CDAI (r value=0.752 at p < 0.001) and between RAPID-3 and SDAI (r value= 0.758 at p < 0.001). They concluded RAPID-3 to be a useful tool in view of its ease of use, no requirement of lab tests and no requirement for joint count.

In a prospective study of 100 newly diagnosed DMARD naïve patients of rheumatoid arthritis in south India by B. Siddhartha Kumar, et al[59], aimed at comparing DAS28, CDAI, RAPID-3 and HAQ-DI (health assessment

questionnaire disability index) a significant positive correlation was observed between DAS28 and RAPID3 with spearman coefficient of 0.404 at $p<0.001$, though the agreement between DAS28 and RAPID3 was relatively less robust in this study with kappa statistic being = 0.072 .

The validity of RAPID3 as a routine disease assessment index was proved in yet another study. This study was carried out by Amit kumar das et al [60] in West Bengal, India from July 2014 to august 2015 and was an observational study. It included 105 adult literate RA patients diagnosed according to the 2010 ACR/EULAR classification criteria for RA. Patients were evaluated at first visit and then followed up at 2 months and 4 months. DAS 28, CDAI and RAPID-3 scores were computed and recorded each time. These scores were then assessed for correlation and agreement. Also, response to treatment was monitored at 2 month and 4 month follow up with treatment target being defined as achieving low disease activity/ remission on follow up. RAPID3 was found to significantly correlate with DAS28 with spearman's rank order correlation coefficient=0.995 and with CDAI with spearman's rank order correlation coefficient=0.943; both highly significant statistically ($p <0.001$). There was a substantial agreement between different severity categories as per DAS 28 and RAPID 3 scores (kappa = 0.959, $p< 0.0001$) and also between severity categories as per CDAI and RAPID 3 scores (kappa = 0.931, $p< 0.0001$). The little discrepancy in this study amongst categories according to DAS28/CDAI versus RAPID-3 was attributed to sensitivity of RAPID 3 questionnaire to long‑term joint damage (i.e., functional impairment of involved joints) as well as inflammatory activity as RAPID3 is a patient based questionnaire. Additional analysis found that RAPID 3 score field had almost similar results in agreement with DAS28 and CDAI scores to assess achievement of treatment target at 2 and 4 month follow‑up. It can be concluded from this study that RAPID 3, performs as well as the two most commonly used indices to assess disease activity in RA - DAS 28

and CDAI, both in terms of measuring quantitative disease activity as well as in monitoring of treatment response on follow‑up.

Another study was conducted by Niels W Boone et al[61] to study the longitudinal association between RAPID-3 and DAS28-ESR and had contrary results. It was a prospective observational cohort study conducted on 330 patients. It however on the contrary concluded that the longitudinal association between these two indices was weak with generalized estimating equation slope β=0.29 and 95% confidence interval (CI) 0.24 to 0.35, meaning one unit increase of RAPID3 corresponded to only 0.29 unit increase of DAS 28. Also, it was found that RAPID3 was most strongly associated with subjective component of DAS 28 i.e. TJC with β=0.89 (95% CI 0.61 to 1.17) and PGA with β=0.94 (95% CI 0.84 to 1.04)) and not with objective components of DAS28 which is SJC with β=0.29 (95% CI 0.17 to 0.41). This study concluded RAPID3 to be poorly associated with DAS 28 over time and hence stated using RAPID3 alone as inadequate to measure disease activity.

In a study by María Fernanda Zurita, et al[62] conducted amongst 200 RA patients from December 2016 to December 2017 to study RAPIPD-3's correlation with other indices, it was seen that RAPID-3 correlated to the best extent with DAS28 (spearman value 0.83, $p < 0.001$), followed by CDAI ($r=0.80$, $p < 0.001$) and then with SDAI ($r=0.77$, $p <0.001$). Concluding that this newer index which can be calculated in 10 seconds correlates well with the traditional indices like DAS28, CDAI and SDAI, which require a longer time for compution and thus RAPID3 can be of help in a busy clinical setting and save time.

Another important study conducted in India was carried out by Harpreet Singh et al[63] in 2012. It aimed to study correlation and agreement of RAPID3 with DAS28 and CDAI amongst 200 literate patients. Statistical analysis indicated that Spearman rank-order correlation coefficients for DAS28 with RAPID3 was 0.910, and for CDAI with RAPID3 was 0.907,

both highly significant ($p < 0.001$). Substantial agreement was seen between RAPID3 and DAS28 with kappa value = 0.634 ($p < 0.001$) and also between RAPID3 and CDAI with kappa value = 0.690 ($p < 0.001$). Thus, 89–94 % of patients who on DAS28 or CDAI scale met moderate/high activity criteria also fulfilled similar RAPID3 severity criteria. 84–88 % of patients who met DAS28 or CDAI remission/low activity criteria also met similar RAPID 3 criteria. Thus RAPID3 scores provide similar quantitative information about disease activity as provided by DAS28 and CDAI. Thereby proving it to be an informative index for evaluation of disease activity in RA in a busy clinic.

This index has begun to find its usage in daily routine disease severity assessment of RA patients. It has also been used in studies on treatment options as an analyser of disease severity and for treatment response. Such a randomized controlled trial was carried out by Vibeke strand et al [64] in which the authors studied efficacy of treatment with tofacitinib using RAPID3 index, CDAI and HAQ-DI index. Data from this trial thus supports the use of RAPID3 index as a means to monitor disease activity as well as long term outcomes at the discretion of the physician.

RAPID3 was proved to be an useful index in yet another study by Theodore Pincus et al.[65] It was conducted by 4 rheumatologists at separate private clinic and each rheumatologist evaluated 50 patients. RAPID 3 was compared on a on a Multidimensional Health Assessment Questionnaire (MDHAQ) with DAS28, CDAI, and with individual core data set measures in terms of correlations, agreement of activity levels, and time to score. In the first part of the study real-time comparison was done between DAS28, CDAI and RAPID3. Patient first completed a MDHAQ and then the clinician calculated RAPID3 from MDHAQ and proceeded for TJC, SJC examination, patient and physician global estimate. Time was recorded for each by an assistant. In the second part of the study, time required to score DAS28, CDAI and RAPID3 as 0-30 and 0-10 scores in

paper patients was calculated. For this 25 patients were randomly selected of the 200 real-time study cases. Here index score was calculated from the individual index component measures prelisted from first step. The 4 indices were scored in this order: RAPID3 score on a 0–30 scale (without conversion to a scale of 10), CDAI score, DAS28 score, and RAPID3 score as a 0–10 score, with conversion from a 0–30 scale using a scoring template and time recorded for each and total 6 rheumatologists were carrying out this part of the study. Results showed DAS28 versus RAPID3 scores were significantly correlated (Spearman's correlation coefficient value $\rho = 0.43$, range 0.36–0.61; $p < 0.001$), and CDAI versus RAPID3 scores were also significantly correlated at higher levels ($\rho = 0.61$, range 0.54–0.77; $P < 0.001$). These 3 indices had significant agreement of severity category with > 80% patients for moderate/high severity category. The kappa value for DAS28 v/s RAPID3 and for CDAI v/s RAPID3 were 0.16 (range 0.12 – 0.20) and 0.27 (range 0.22 – 0.37) respectively. While the weighted kappa value for DAS28 v/s RAPID3 and for CDAI v/s RAPID3 were 0.27 (range 0.13 – 0.33) and 0.44 (range 0.26 – 0.58) respectively. The final interpretation for agreement being fair agreement of RAPID3 with DAS28 and CDAI both. The study also showed that mean time required to perform a 28-joint count by the rheumatologists was 94 seconds, while the mean times to score the DAS28, CDAI, RAPID3 on a 0–10 scale, and RAPID3 on a 0–30 scale were 114, 106, 9.6, and 4.6 seconds respectively. It thus concluded that RAPID3 score correlate to DAS28 and CDAI, while it can be calculated on a 0–30 scale in just about 5% of the time required for the other two scores.

Another study was done by Burkhard F Leeb et al[66] in 128 OPD RA patients to evaluate agreement between RAPID3, RADAI-5, DAS28 ESR and CDAI , in daily routine. Cronbach's alpha for internal consistency and Kendall's Tau were calculated for the statistical analysis. Cronbach's alpha value for the RADAI-5, RAPID 3, DAS28 ESR and CDAI were 0.906, 0.871, 0.165 and 0.210 respectively. Tau for the agreement between the

RADAI-5 versus RAPID-3 was calculated to be 0.587 ($p<0.001$), and for DAS28-ESR versus CDAI to be 0.582 ($p<0.001$), while it was lower for the relationship between the questionnaires and the composite indices. Thus the authors concluded that reliability of the RAPID-3 and RADAI-5 was significantly higher than of DAS28 and CDAI. RAPID3 v/s RADAI-5 and DAS28-ESR v/s CDAI proved to be in high-moderate agreement, while agreement between RAPID3/RADAI5 v/s DAS28-ESR/CDAI appeared to be lower. They also inferred that RAPID3 and RADAI5 required only about 25 seconds of time to score.

Yet another comparative study was conducted by Seong Kyu-kim et al[67] to evaluate RAPID3, DAS28, CDAI and SDAI in 400 korean RA patients using spearman coefficient. RAPID3 score was significantly correlating with DAS28 ($r = 0.62$), SDAI ($r = 0.74$), and CDAI ($r = 0.75$); at $p < 0.0001$ for all indices; and with other activity measures including SJC, TJC, ESR and CRP. Greater than 86 % of patients with high-to-moderate disease activity on DAS28, CDAI, and SDAI had similar disease activity using RAPID3 score. However, approximately 50% of patients with remission-to-low disease activity in DAS28, CDAI, and SDAI showed remission-to-low disease activity in RAPID3. This study hence inferred that RAPID3 as an informative disease activity index with equivalent values of DAS28, CDAI, and SDAI. They also suggested that RAPID3 reveals differential agreement in patients with lower disease activity.

Since recent times there has been increased emphasis on measurement of disease activity as assessed directly from the patient, without interpretation from the physician i.e. Patient Reported Outcomes (PROs).[68] There has been emphasis from multiple groups to integrate outcomes that reflect the symptoms and life impact of disease of most relevance to patients as endpoints in clinical trials and as part of standard clinical assessment in practice.[69-72] There has been emphasis on the principle that RA therapy should be based on a shared treatment plan

between the patient and the doctor.[36] Hence, there has been development of various indices based upon PROs, and there is growing need of studies for validation and research of these indices. Jose Hendrikx et al[73] in a systemic review concluded that PROs-based instruments identified 17 measures aimed at monitoring disease activity in RA and overall 4 indices have been extensively validated i.e.- Pt-DAS28, RADAI, RADAI-5 and RAPID 3. We here in the present study intend to evaluate two of these index - RADAI-5 and RAPID3 in comparison to DAS28 and CDAI.

Today even further advancement is taking place and smartphone application[74] is being innovated in Netherlands, which can self-initiate care in patients of RA. It intends to use RAPID3 along with DAS28 to alarm the user RA patient about a flare and hence seek medical attention.

There are some gaps in current knowledge and areas of limitation requiring further research like reason of higher degree of correlation between RADAI-5, RAPID 3 with DAS 28, CDAI classification of disease activity as the severity of disease increases. A stable remission according to RADAI 5 holds a different meaning than remission according to DAS 28 or CDAI, as the RADAI-5 questionnaire includes time factor and thus a remission according to RADAI 5 scoring cannot be expected after a short period of time.

RADAI-5 and RAPID-3 offer the advantage of easy, quick and practical way for assessment of disease activity in RA, without need of formal joint examination or blood tests. This makes them suitable for use in a heavy OPD load especially in a resource limited setting. Also since these are entirely assessed by patient, they can be of more use in COVID pandemic times. This study was done to find out if RADAI-5 and RAPID-3 offer the same information on disease activity as by DAS 28 and CDAI and to evaluate their correlation and concordance. This is important since treatment decisions are based on disease activity. Also there are only few

studies of Indian setting evaluating RADAI-5 and RAPID3. Since Indian population has varying education level ranging from uneducated to post-graduate, RADAI-5 was translated and validated in Punjabi language (native language of Punjab) so that it could be easily understood by all sections of society, thus further increasing the feasibility of RADAI-5. RADAI-5 and RAPID3 can be computed conveniently and quickly in an OPD setting, and hence help in treatment decision making at minimal costs and administrative burden.

MATERIAL AND METHODS

SOURCE OF DATA

Patients visiting medicine and rheumatology OPD at DMCH, Ludhiana and who met the 2010 ACR/EULAR classification criteria of RA were enrolled in the study from December 2019 to October 2021. ESR value and any other investigations available with them were recorded. Proforma, including all the parameters required for calculation of DAS28, CDAI, RADAI-5 and RAPID3, was used as a source of data for the study.

INCLUSION CRITERIA

- Patients aged 18 years and above who gave consent to participate in this study.
- Fulfilling 2010 ACR/EULAR classification criteria for Rheumatoid Arthritis.

EXCLUSION CRITERIA

Patients who were severely anemic (Hb <7gm/dl), having pre-existing renal, cardiac, liver or pulmonary disease.

SAMPLE SIZE

For validation of RADAI-5 in Punjabi language, initial 2 months of study were used and 45 patients were enrolled for validation phase of the study (from 10 December, 2019 to 10 February, 2020)

For study of correlation of RADAI-5 and RAPID3 with DAS28 and CDAI, 200 patients were enrolled from 11 February 2020 to 14 October 2021. This sample size is interpreted to be appropriate as per the standard formula of sample size for correlation study.[75]

$$N = \left(\frac{z_{\alpha} + z_{\beta}}{C(r)} \right)^2 + 3$$

where N = sample size to achieve results at specified significance level and power

C(*r*) = 0.5 * ln[(1+r)/(1-r)]

r = correlation coefficient

α: two sided test of significance level (the probability of type I error)

β: the probability of type II error (1 – power of the test)

Z_{α} and Z_{β} = the standard normal deviate for α and β, respectively

When sample size calculated for a study with type I error of 5 % and power of study at 80%, with r = 0.21 (minimum possible r value for correlation to exist),[76] sample size comes out as 176 and this study included 200 patients, to increase the power. Thus, the sample size is adequate.

METHOD OF COLLECTION OF DATA

Patients meeting the 2010 ACR/EULAR classification criteria of RA and thus qualifying for diagnosis of RA and visiting the medicine or rheumatology OPD of DMCH, Ludhiana from December 2019 to October 2021 were approached for the study. While computing the 2010 ACR/EULAR score, already available RF factor or/and Anti-CCP value was used and if any patient had RF qualitative being positive, it was scored as low positive RF titre. Out of the patients fulfilling the 2010 ACR/EULAR criteria, those who fulfilled the inclusion criteria and consented to participate in the study were enrolled. Those meeting the exclusion criteria were excluded from the study. First of all RADAI-5 was translated to Punjabi language after seeking permission from the developer Dr Burkhard Leeb, following the guidelines of forward and backward translation. To be able to use translated Punjabi version of RADAI-5, its validity and psychometric properties were tested for 2 months duration in the validation phase of study. In this 2 month duration, 45

patients were enrolled and their RADAI-5 scores were obtained along with DAS28 and CDAI. Statistical analysis were then applied to assess the Punjabi version of RADAI-5. The statistical results showed Punjabi version of RADAI-5 to be valid. Thence onwards, it was used for rest of the study. Proforma including demographic profile of the patient, vitals, latest value of ESR, lab results, presence/absence of deformity, SJC, TJC, PGA, EGA, GH and containing parameters of DAS28, CDAI, RADAI5 and RAPID3 was completed for each of the study patient. Additionally CRP value, if available with the patient was recorded. The ESR value used for the study is by Westergren method. Formal joint examination was done bilaterally for shoulder, elbow, wrist, knee, first to fifth metacarpophalangeal joint, interphalangeal joint of thumb and second to fifth proximal interphalangeal joint and values of TJC and SJC were recorded. For calculation of score of Punjabi version of RADAI 5, a questionnaire for self filling (or narrated in Punjabi to the patient by the interviewer and answer for score recorded) containing 5 self explainatory questions in Punjabi was administered and the patients had to score those items on 0 – 10 ordered category scale. For RAPID3, a questionnaire for self filling (or narrated in Punjabi to the patient by the interviewer and answers for score recorded) containing 3 main questions was administered. Question 1 had further 10 questions, each scored from 0 – 3 and value of these 10 question added and converted to formal score ranging from 0 – 10 using the conversion table of standard RAPID3. Question 2 and 3 were scored from 0-10. DAS28 (ESR) and CDAI were computed using the formula

- DAS28 = $0.56 \sqrt{TJC} + 0.28 \sqrt{SJC} + 0.70(\log ESR) + 0.014(GH)$
- CDAI = TJC + SJC + PGA + EGA
- RAPID-3 and RADAI-5 scores calculated from scores of questionnaire

PERMISSION TO USE THE NEW SCORES – RADAI-5 and RAPID3

RADAI-5 was translated in Punjabi after seeking permission from the developer Dr Burkhard Leeb, MD. Also RADAI-5 is available in public domain for use. RAPID3 was used after obtaining a license from RWS life sciences for use of RAPID3 and if needed, the examiner could read the questions to the patient in Punjabi language as permitted in the license.

TRANSLATION OF RADAI-5 INTO PUNJABI LANGUAGE

After obtaining permission from the developer of RADAI-5, the English version was translated to Punjabi version by using the standard guidelines of American Association of Orthopaedic Surgeons (AAOS).[77] It is one of the widely used and universally accepted guideline for the translation of patient reported outcomes.[78] AAOS guidelines have been previously used in translation of RA disease activity measuring indices to other languages including translation of RADAI to Thai language[79] and translation of RADAI-5 into Turkish language.[54]

Translation Process:- It included the following steps

1) Forward translation:

Two translators independently translated the original RADAI-5 into Punjabi version. One translation was done by a doctor (person 1) and the other by a translator (person 2).

2) Selection and synthesis of the most appropriate Punjabi translated version: A team of two members, both doctors and faculty members (person 3 and 4) then reviewed the two translations and the most appropriate one was selected. Further changes were made by the team to make the chosen Punjabi version of RADAI-5 conceptually equivalent to original RADAI-5 and yet simple enough to be understood even by the uneducated section of the population.

3) Backward Translation:

This Punjabi version of RADAI-5 was then translated back to English language by a doctor and faculty member (person 5) and an English teacher (person 6). Both of them were unfamiliar with the English version of RADAI-5. Both versions were compared to the original RADAI 5 by the doctor and English teacher (person 5 and 6). It was then concluded that the back translated forms are almost matching up with the original RADAI-5 in English.

4) Review of forward and backward translation and choosing a final version:

The forward translation of RADAI-5 and backward translation of Punjabi version of RADAI-5 into English were then compared with the original version of RADAI-5 by team of person 3, person 4, a forward translator (person 1) and a backward translator (person 5). They were compared and assessed on question to question basis and existence of their conceptual equivalence was established. Any discrepancy was resolved. Grammar was reviewed. Simplicity of words in the question was reviewed. Clarity of question was also assessed. Then the final version of Punjabi RADAI-5 was selected. This was pretested in the RA patients visiting the OPD for 3 days by the above mentioned team and found to be easily comprehended by patients, easy to understand and was able to convey the patients purpose of each question as being different without repetition.

Then validation phase of study begun. The Punjabi version of RADAI-5 was studied in 45 patients of RA, over a span of two months duration, in order to validate it. After achieving its validity and confirming its psychometric properties, Punjabi version of RADAI-5 was used further in 200 OPD patients to do a comparative study of various disease activity indices of RA.

STATISTICAL ANALYSIS

The data generated from 200 OPD RA patients was simplified and interpreted in terms of mean, maximum value, minimum value, standard deviation and percentage of occurrence. Scores for DAS28, CDAI, Punjabi version of RADAI-5 and RAPID3 were calculated for each patient using the formulas in excel sheet. Spearman correlation coefficient was used to study the correlation between the different disease activity indices i.e. DAS28, CDAI, Punjabi version of RADAI-5 and RAPID3. Kappa agreement statistics was used to study the agreement between the four indices.

Cronbach's alpha of internal consistency was additionally used to validate the Punjabi version of RADAI 5 along with Spearman correlation coefficient.

The representation of categorical variables was done in percentage or number of patients in a particular category or pie-charts. To represent correlation between these 4 indices, scatter plot diagrams were used. To represent severity category of patients as per the above four RA disease activity assessing indices and their agreement, cross tabulation and bar graphs were used.

The statistical analysis was done using SPSS software.(Statistical Package for the Social Science) SPSS 21 version statistical program for Microsoft Windows. A probability value (p value) less than 0.05 was considered statistically significant. Results were represented in the form of appropriate graphs.

OUTCOME

Newly synthesized Punjabi version of RADAI-5 was validated using the statistical analysis of Cronbach's alpha, Spearman's correlation coefficient and floor/ceiling effect on 45 RA patients in validation phase of study. Cronbach's alpha was interpreted using standard guidelines[80] stating that value of >0.7 is considered to be indicative of good level of internal

consistency. Spearman's coefficient value also interpreted using standard guidelines as in table 7.[76] Punjabi version of RADAI-5 was found to be feasible, reliable and valid. Hence Punjabi version of RADAI-5 can be easily and conveniently used in Indian Punjabi population.

Then the final outcome was studied in terms of correlation and level of agreement between RAPID3 and Punjabi version of RADAI-5 in comparison to DAS28 and CDAI using Spearman's correlation coefficient and Kappa agreement statistics respectively. The values obtained were interpreted using the standard guidelines.

Table 7 : Interpretation of Spearman's correlation coefficient value[76]

Value	Interpretation of strength of correlation
0.00 – 0.20	Negligible
0.21 – 0.40	Weak
0.41 – 0.60	Moderate
0.61- – 0.80	strong
0.81 – 1.00	Very strong

Table 8 : Interpretation of Kappa statistics by guidelines of Landis and Koch (1977)[81]

Value of Kappa	Interpretation
< 0	No agreement
0.0 – 0.20	Slight agreement
0.21 – 0.40	Fair agreement
0.41 – 0.60	Moderate agreement
0.61 – 0.80	Substantial agreement
0.81 – 1.00	Almost perfect agreement

Thus equivalence of patient based questionnaires of RADAI-5 in Punjabi language and RAPID-3 (which are relatively new and do not require blood investigations, or formal joint count) to the conventional scores of DAS-28 and CDAI (which require blood investigations, formal joint count and so time consuming) in assessing the disease activity correctly was evaluated.

METHODOLOGY

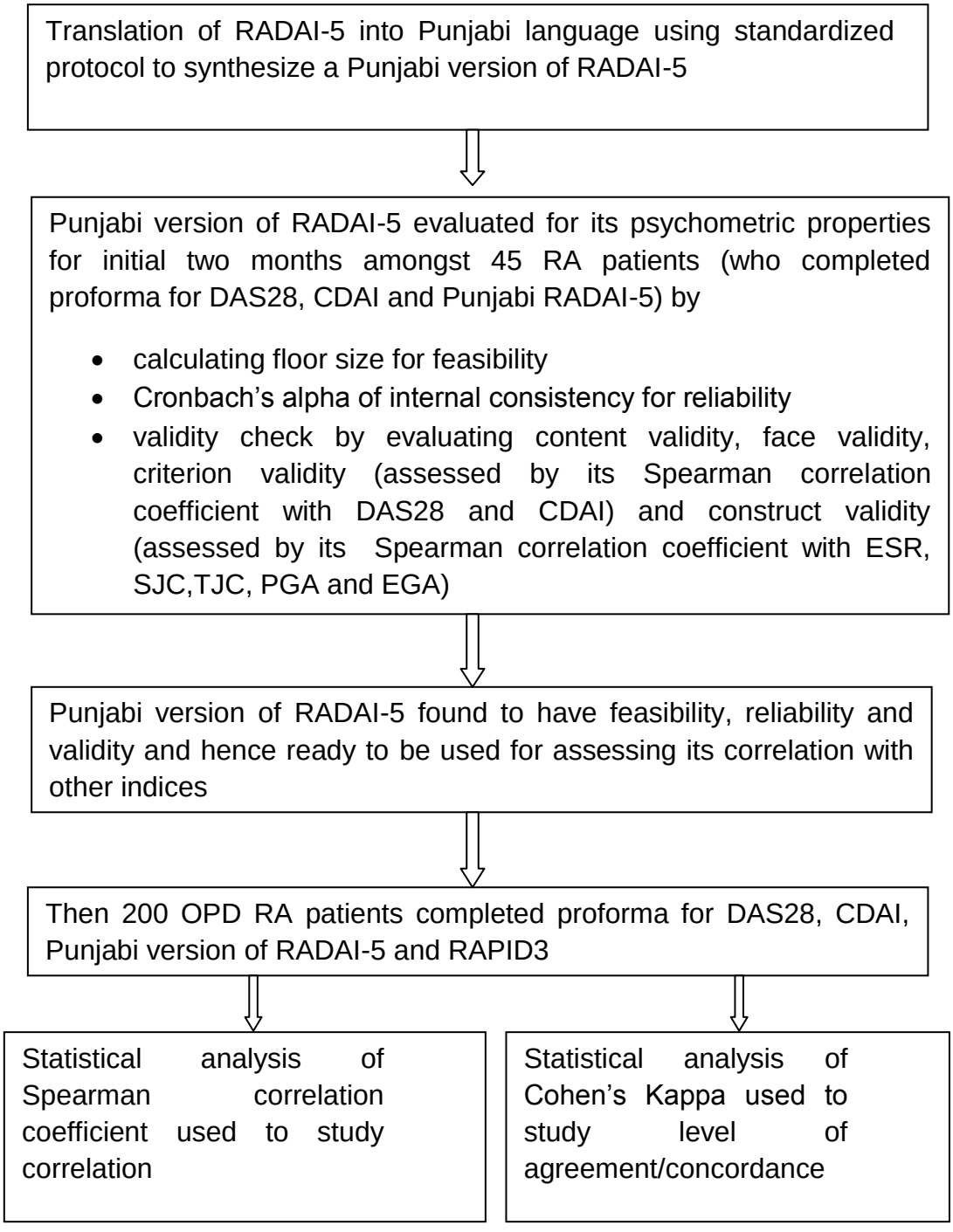
Translation of RADAI-5 into Punjabi language using standardized protocol to synthesize a Punjabi version of RADAI-5
Punjabi version of RADAI-5 evaluated for its psychometric properties for initial two months amongst 45 RA patients (who completed proforma for DAS28, CDAI and Punjabi RADAI-5) by
calculating floor size for feasibility
Cronbach's alpha of internal consistency for reliability
validity check by evaluating content validity, face validity, criterion validity (assessed by its Spearman correlation coefficient with DAS28 and CDAI) and construct validity (assessed by its Spearman correlation coefficient with ESR, SJC,TJC, PGA and EGA)
Punjabi version of RADAI-5 found to have feasibility, reliability and validity and hence ready to be used for assessing its correlation with other indices
Then 200 OPD RA patients completed proforma for DAS28, CDAI, Punjabi version of RADAI-5 and RAPID3
Statistical analysis of Spearman correlation coefficient used to study correlation
Statistical analysis of Cohen's Kappa used to study level of agreement/concordance

Figure 4: Flow chart depicting the study methodology

OBSERVATIONS AND RESULTS

To validate RADAI-5 in Punjabi language (Validation phase of study) : After translating RADAI-5 into Punjabi version by the standard protocol, OPD RA patients were recruited during the first two months time frame to validate the Punjabi version of RADAI-5 before using the Punjabi version of RADAI-5 further in this study. The patients who fulfilled the 2010 ACR/ EULAR criteria of classification of RA, and met the inclusion criteria over the span of first two months were included. Those meeting the exclusion criteria were excluded. 45 patients were thus recruited in validation phase of study. These patients filled the proformas for calculating RADAI-5 score, DAS28 and CDAI. Along with this, data about their demographic profile, general physical examination details and available blood investigations were recorded. Formal joint count done for TJC, SJC and their ESR values were recorded. While administering Punjabi version RADAI-5 to the patients it was observed that all the 5 question put cross the patient were easily and clearly understood. Patients faced no difficulty in answering right away nor did they need any help or explanation to understand the meaning of the question. Since it was translated into the native language of Indian Punjabi population, even the less educated patients were able to understand and answer the question read in Punjabi. The elder subgroup of the population was also able to rate score for their answers easily. Being in native language, patients from all sections of society faced no difficulty in answering the questions of Punjabi RADAI-5. Scores were then calculated for Punjabi version of RADAI-5, DAS28 and CDAI. Statistical analysis applied to confirm the validity and psychometric parameters of this new Punjabi version of RADAI-5 are as follows.

For these 45 patients, the mean age was 46.93 ± 13.43 years. Their mean score for question 1(Q1), question 2 (Q2), question 3(Q3), question 4(Q4), and question 5(Q5) of Punjabi version of RADAI-5 were 6.11±2.66, 5.53 ± 2.94, 3.76 ± 2.99, 3.51± 2.51 and 0.93 ± 1.34 respectively. The mean

RADAI-5 score was 3.97 ± 1.80 with range of 0.40- 6.80 in validation study.

Table 9 : Mean score for five questions of Punjabi version of RADAI-5 for validation study		
Question number	**Mean score**	**Standard Deviation**
RADAI 5 Q1	6.11	2.656
RADAI5 Q2	5.53	2.943
RADAI5 Q3	3.76	2.994
RADAI5 Q4	3.51	2.510
RADAI5 Q5	0.93	1.338

The Cronbach's Alpha value obtained using SPSS (Statistical Package for the Social Science) SPSS 21 version statistical program for Microsoft Windows for this 5 item questionnaire of Punjabi version of RADAI-5 was = 0.745. This signifies an acceptable internal consistency of Punjabi version of RADAI-5 questionnaire of RADAI-5 and hence its reliability (explained in discussion).

Table 10 : Cronbach's alpha obtained for Punjabi version of RADAI-5 (for validation phase of study)		
Cronbach's Alpha	**Cronbach's Alpha Based on Standardized Items**	**Number of Items**
.745	.743	5

The mean RADAI-5 score was 3.97 ± 1.80 with lowest RADAI-5 score of 0.40 and highest RADAI-5 score of 6.80. Only one patient had the lowest RADAI-5 score of 0.4 and only one patient had the highest RADAI-5 score of 6.8. None had score of 0 or 10.Thus there was no floor or ceiling effect. This helps in feasibility check of RADAI-5 in Punjabi language.

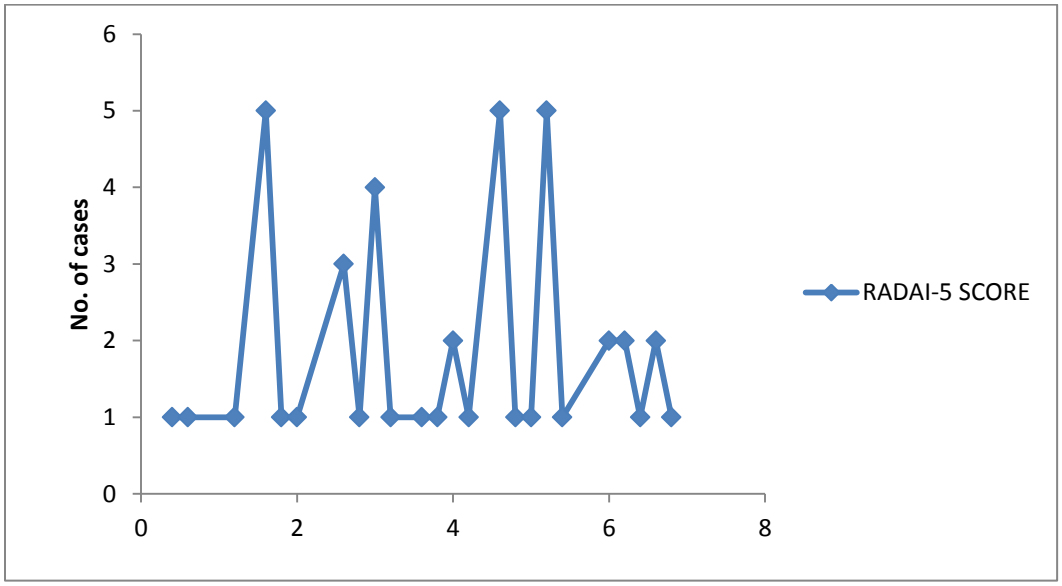

Figure 5: Frequency distribution of Punjabi version of RADAI-5 score in 45 patients for validation phase of study

The Spearman correlation coefficient of Punjabi translated RADAI-5 with DAS-28 and CDAI was calculated to assess correlation for the criterion validity of Punjabi version of RADAI-5 for validation phase of study

Table 11 – Criterion validity parameters for evaluating Punjabi version of RADAI-5 (validation phase of study)		
RA DISEASE ACTIVITY SCALES	**DAS- 28**	**CDAI**
Punjabi version of RADAI-5		
Spearman correlation coefficient	0.835	0.797
P value	<0.0001	<0.0001

The Spearman correlation coefficient of Punjabi version of RADAI-5 with DAS-28 and with CDAI for validation phase of study, came out to be 0.835 and 0.797 respectively, both with p value < 0.0001 i.e. both statistically significant. Thus there is significant criterion correlation of newly synthesized Punjabi version of RADAI-5 with DAS-28 and CDAI in validation phase of the study. This further inferred the criterion validity of RADAI-5 in Punjabi language.

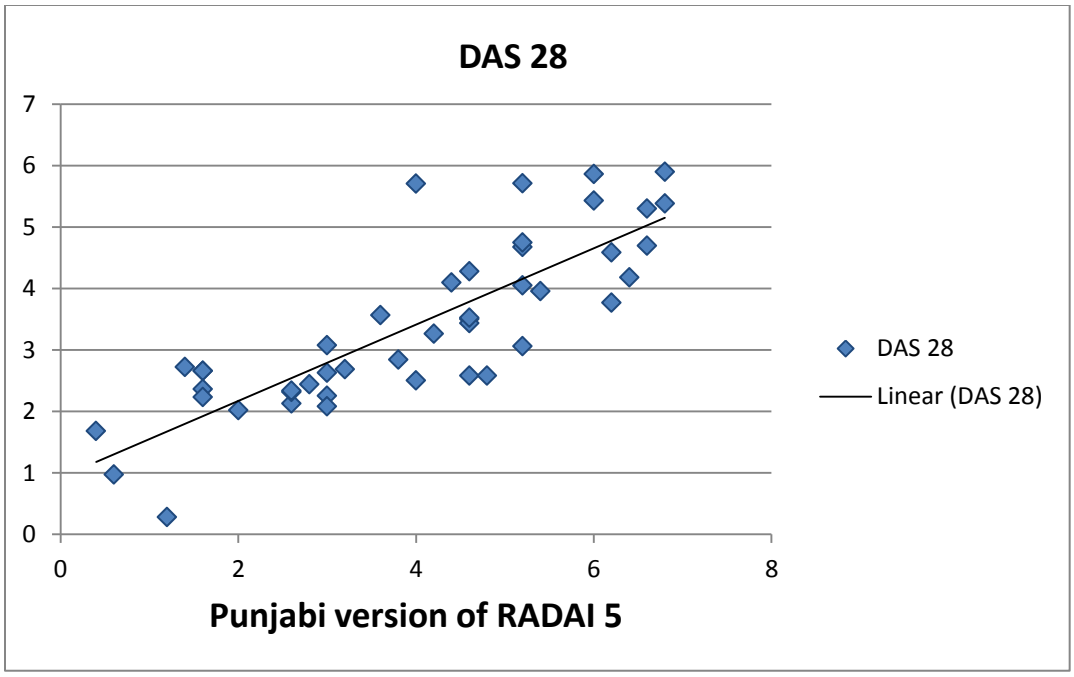

Figure 6a: Graph showing correlation of Punjabi version of RADAI-5 with DAS28 for Criterion validity (validation phase of study)

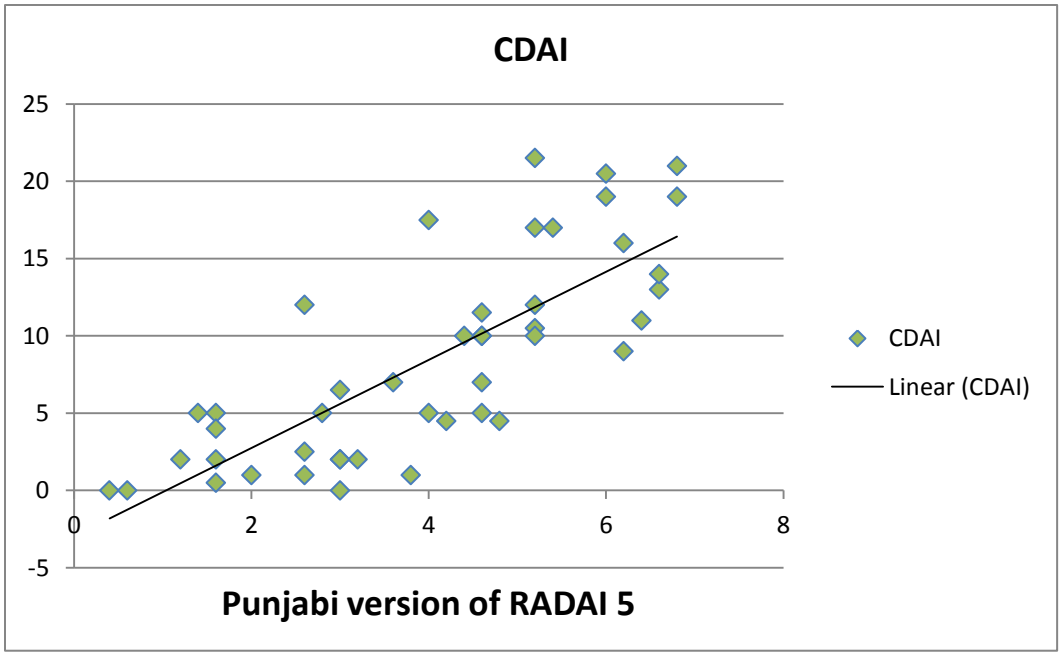

Figure 6b: Graph showing correlation of Punjabi version of RADAI-5 and CDAI for Criterion validity (validation phase of study)

Table 12 – Construct validity parameters of Punjabi version of RADAI-5 (validation phase of study)		
Parameter assessed for correlation with Punjabi version of RADAI-5	**Spearman's correlation coefficient**	**p value**
ESR	0.650	< 0.0001
SJC	0.567	< 0.0001
TJC	0.764	< 0.0001
PGA	0.758	< 0.0001
EGA	0.779	< 0.0001

For evaluating the construct validity of Punjabi version of RADAI-5, correlation of score of Punjabi version of RADAI-5 with ESR, SJC, TJC, PGA and EGA was assessed using Spearman's correlation coefficient

These values being suggestive of significant positive correlation of Punjabi version of RADAI-5 with ESR, SJC, TJC, PGA and EGA in validation phase of study. It had highest correlation with EGA followed by TJC among these five parameters. This establishes construct validity of Punjabi version of RADAI-5.

To study the correlation and concordance of RAPID3 and RADAI-5 with DAS28 and CDAI:

After translating and validating RADAI-5 in Punjabi language, the aim was to study the correlation between Punjabi version of RADAI-5 and RAPID-3 with DAS-28 and CDAI. For this 200 OPD RA patients were enrolled from 11 February 2020 to 14 October 2021. Out of these four RA disease severity assessment scores, DAS-28 and CDAI require formal joint count by the physician while RADAI-5 and RAPID3 do not require so. Additionally DAS-28 also requires a blood investigation result of ESR while no blood tests are required in RADAI-5 and RAPID-3. Also RADAI-5 and RAPID-3 are patient based questionnaires which can evaluate patient's burden of disease. Thus RADAI-5 and RAPID-3 can prove to be more practical, quick and cost effective to administer and hence more useful in a busy OPD especially in a resource limited setting. 200 OPD based RA patients fulfilling the inclusion criteria (and without any exclusion criteria) were enrolled in study. This data on analysis resulted in following observations.

Table 13 – Gender distribution in the study		
Gender	**No. of cases**	**Percentage**
Female	171	85.5%
Male	29	14.5%
Total	200	100.0%

Among the 200 patients, majority were female patients. 85.5 % (171 out of 200) were female and 14.5 % (21 out of 200) were male.

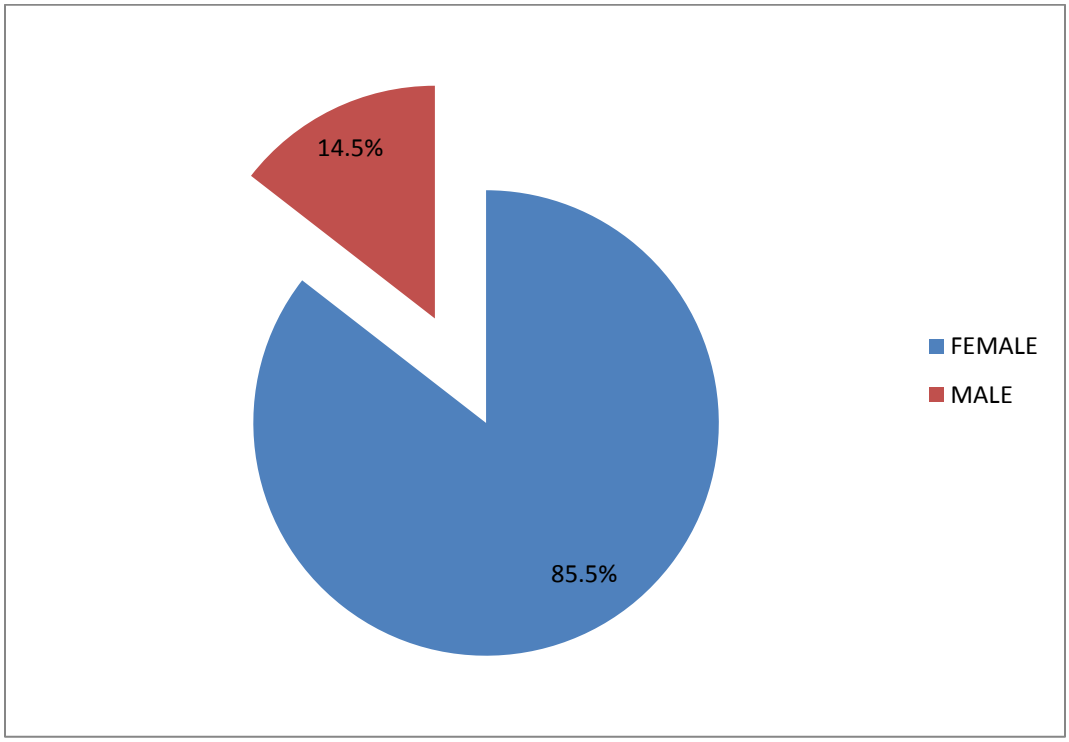

Figure 7: Gender distribution in the study

Table 14- Age distribution in the study		
Age Group (in years)	**No. of cases**	**Percentage**
< 30	17	8.5%
31-40	41	20.5%
41-50	65	32.5%
51-60	48	24.0%
> 60	29	14.5%
Total	200	100.0%

Age distribution across the 200 patients was another parameter observed in the study. The mean age was 47.65 ± 12.15 years. Out of 200 patients, 8.5% (17 patients) were < 30 years age, 20.5% (41 patients) were 31–40 years old, 32.5 % (65 patients) were in the age group of 41-50 years, 24% (48 patients) were in age group of 51- 60 years and 14.5 % (29 patients) were > 60 years old.

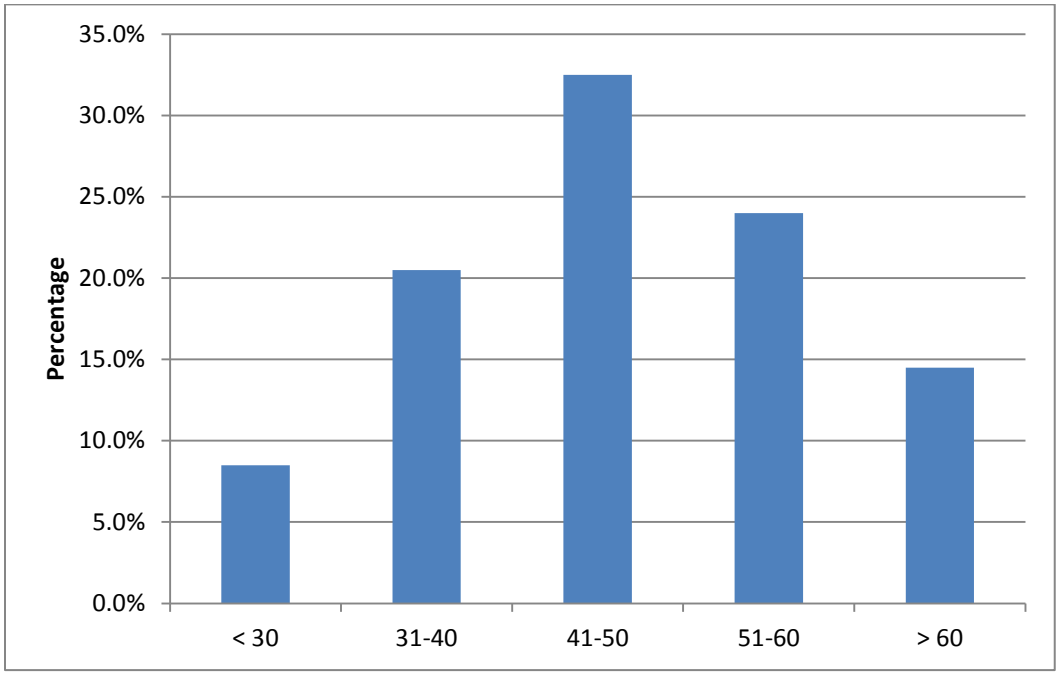

Figure 8: Age distribution in the study

Table 15- Education level of various study subjects		
Education Level	**No. of cases**	**Percentage**
Uneducated	30	15.0%
Primary (class1-5)	24	12.0%
Secondary (class 6-10)	78	39.0%
Higher Secondary (class 11 - 12)	37	18.5%
Studying	4	2.0%
Diploma	2	1.0%
Graduation	19	9.5%
Post Graduation	6	3.0%
Total	200	100.0%

15 % (30 patients) were uneducated. 12 % (24 patients) studied till primary level [i.e. class 1 – 5]. 39 % (78 patients) were educated upto secondary level [i.e. class 6 -10]. 18.5 % (37 patients) did their schooling upto higher secondary level [i.e. class 11 -12]. While 2% (4 patients) were still studying. 1% (2 patients) had completed their education upto Diploma level. 9.5 % (19 patients) were graduates and 3 % (6 patients) were post-graduates.

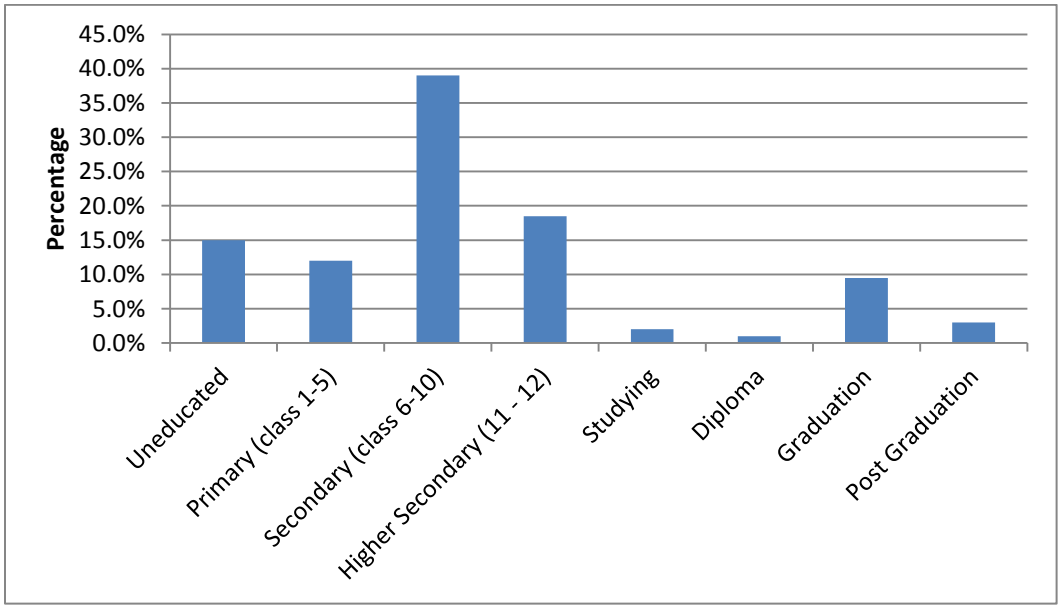

Figure 9: Education level of various study subjects

Table 16- Disease duration distribution in the study		
Disease duration	**No. of cases**	**Percentage**
<2 years	32	16.0%
2 to <10 years	119	59.5%
≥ 10 years	49	24.5%

Disease duration is yet another important parameter. 16 % (32 patients) had < 2 years duration of RA. 59.5 % (119 patients) had onset of RA between 2 year – 10 years from the time of recording their answers. 24.5 % (49 patients) had long standing RA for ≥ 10 years.

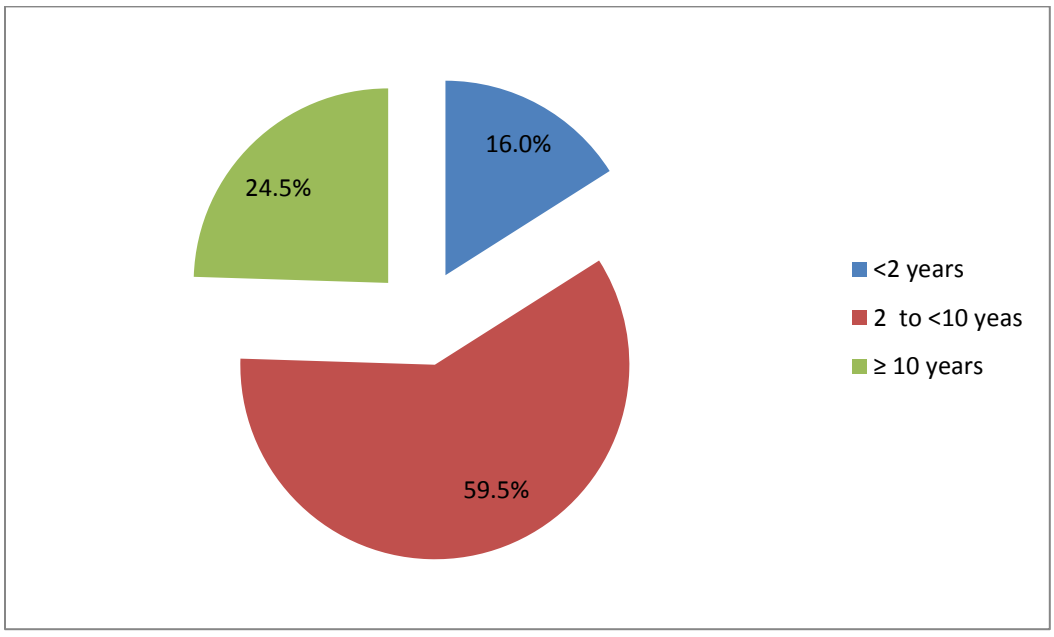

Figure 10: Disease duration distribution in the study

Table 17- Seropositivity distribution in the study		
Types of RA according to serological markers	**No of cases**	**Percentage**
Seropositive	172	86.0%
Seronegative	28	14.0%

The study had majority of the patients who were seropositive. 86% (172 patients) were seropositive. Seropositive patients included patients having any one antibody positive out of RF factor and Anti-CCP or both positive. Seronegative patients included those who were negative for both RF factor and anti-CCP antibodies. 14 % (28 patients) were seronegative.

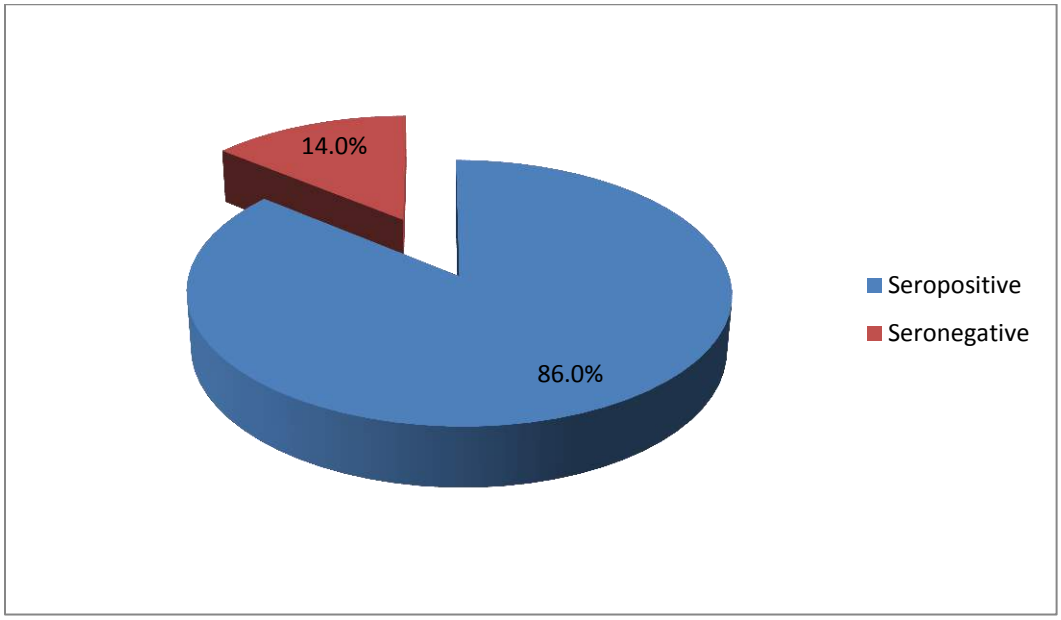

Figure 11: Distribution of study subject according to serology

Table 18- Frequency of smokers in the study		
Smoker	**No. of cases**	**Percentage**
No	198	99.0%
Yes	2	1.0%
Total	200	100.0%

Out of the total, only 1% (2 patients) had history of smoking.

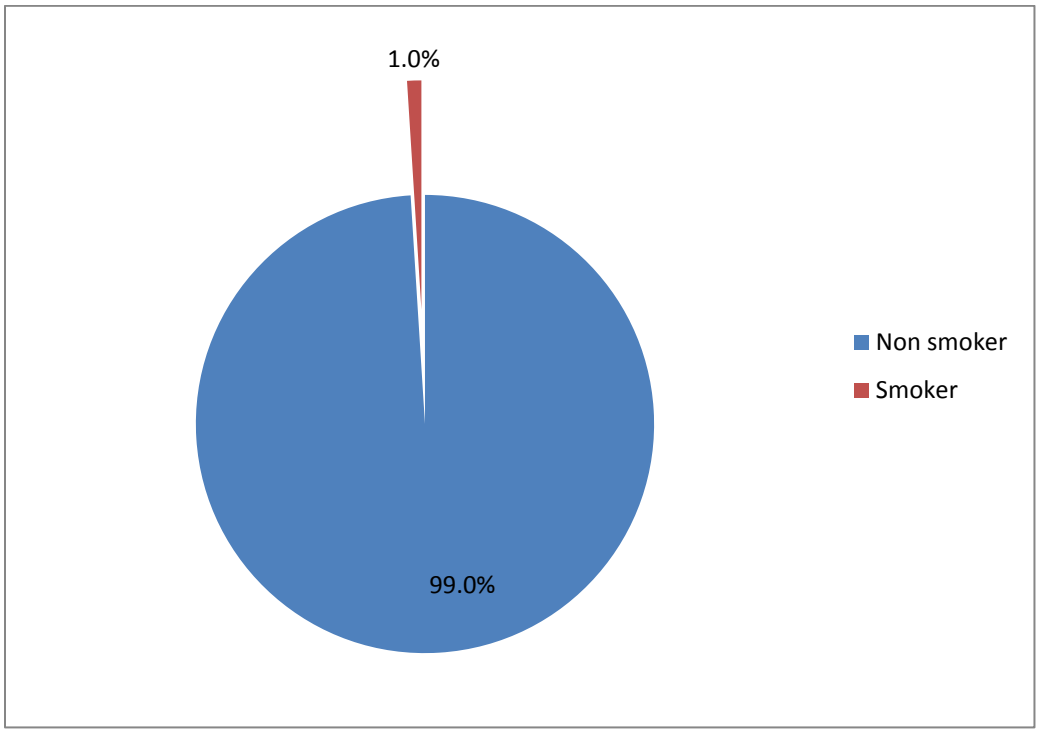

Figure 12: Frequency of smokers in the study

Out of the 200 patients enrolled, X-ray based evidence of erosions was present only in 3 % (6 patients). In rest mostly X-ray of joints was not done and few had no evidence of erosions on X-ray.

Table 19- Distribution of positive family history in study		
History of RA in family	**No. of cases**	**Percentage**
No	171	85.5%
Yes	29	14.5%
Total	200	100.0%

While interviewed for family history of RA in the 200 study patients, 14.5 % (29 patients) gave history of RA being present in other family members also. Among these 14.5% patients, 26 patients had RA in first degree relative, 5 patients had history of RA in second degree relatives and 1 patient had history of RA in third degree relative.

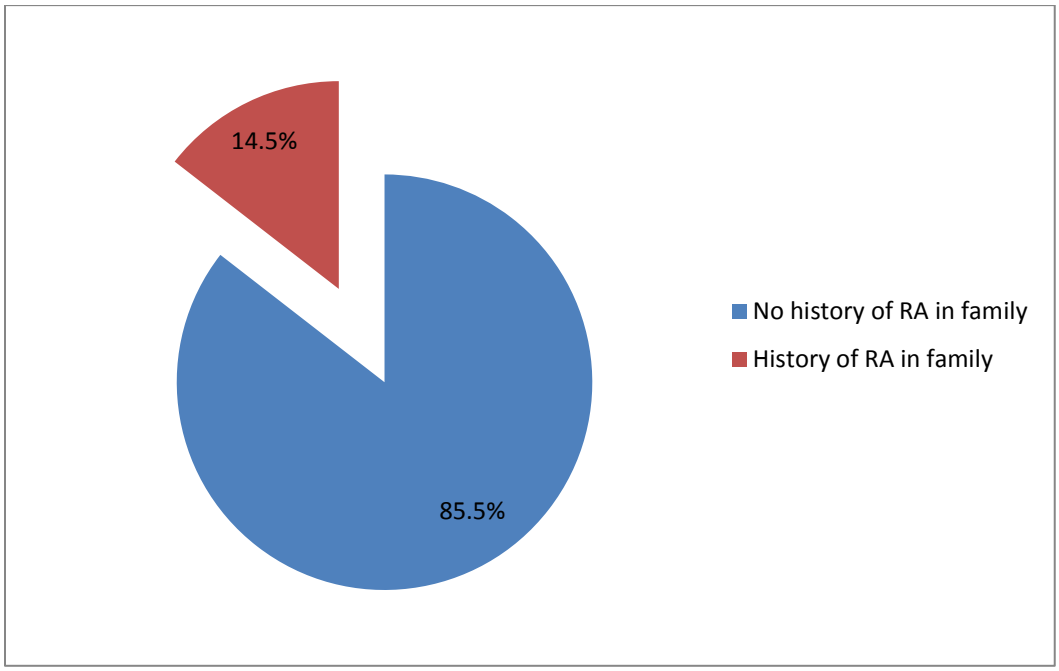

Figure 13: Study subjects with positive family history of RA

Table 20- Coexistinent comorbidities in patients of the study		
Co-existing co-morbidity	No of patients	Percentage
Diabetes Mellitus (DM)	18	9%
Hypertension (HTN)	33	16.5%
Hypothyroidism	23	11.5%
Autoimmune co-morbities		
Type 1 DM	1	0.5%
Vitiligo	1	0.5%
Psoriasis	1	0.5%
Other comorbidities		
Severe osteoarthritis (OA)	4	2%
Polycystic ovary disease (PCOD)	1	0.5%
HCV reactive	2	1%
Nephrolithiasis	1	0.5%
Cholelithiasis	1	0.5%
Irritable bowel syndrome (IBS)	1	0.5%

Coexistent comorbidities seen in the 200 study population was as above. These includes both autoimmune and non autoimmune co-existing diseases, other than the disease meeting exclusion criteria. Patients having pre-existing renal, cardiac, liver or pulmonary disease were excluded out of the study as per exclusion criteria.

Of all the co-morbidities the most prevalent one in the study group were HTN (hypertension) seen in 16.5% (33 patients) followed by hypothyroidism seen in 11.5% (23 patients) and then DM (diabetes mellitus) in 9 % (18 patients). Hypothyroidism can be attributed as an autoimmune disease seen in RA patients. Various other autoimmune and non autoimmune disease were seen in small percentages as above

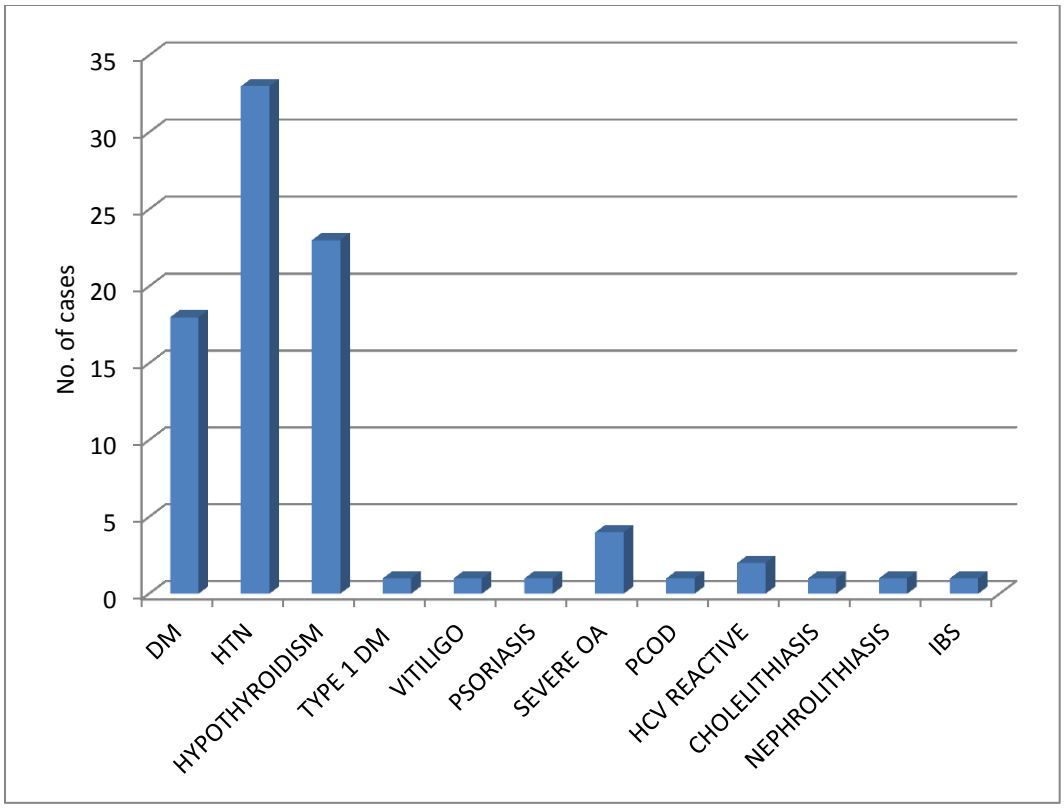

Figure 14: Coexistent comorbidities in patients of the study

Table 21-Number of patients with deformity in the study		
Deformity	**No. of cases**	**Percentage**
No	127	63.5%
Yes	73	36.5%
Total	200	100.0%

A total of 36.5 % (73 patients) cases in the study had already existing joint deformities due to RA on examination.

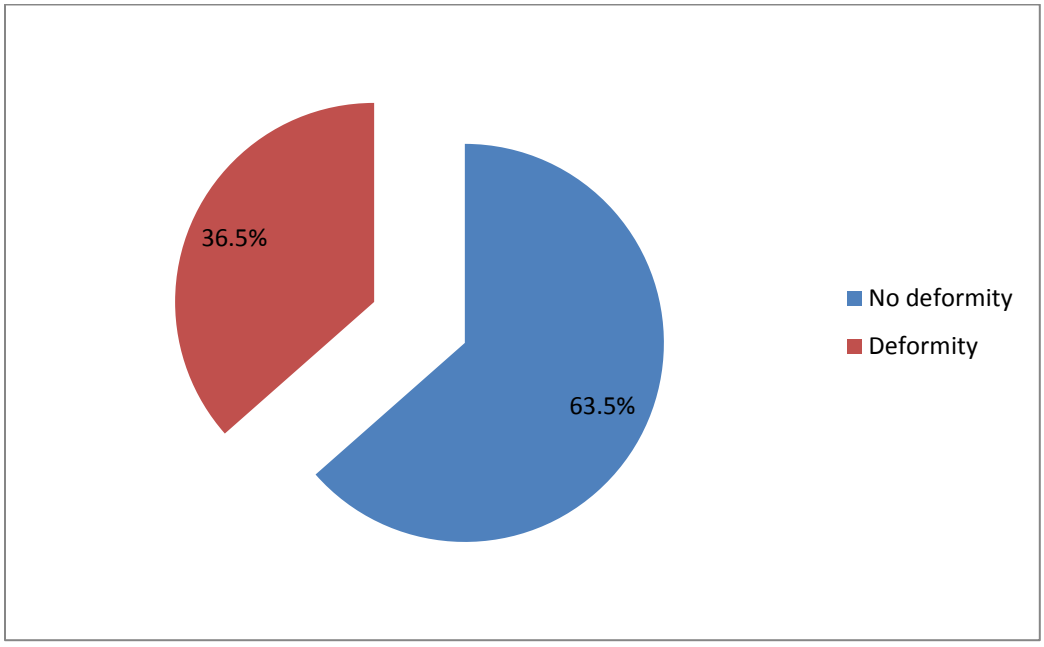

Figure 15: Percentage of patients with deformities in the study

Various extra-articular manifestations of RA seen in the study and their percentage distribution are as follows:

Table 22 – Various extra-articular manifestations seen and their frequency		
Extra-articular manifestation seen	**No. of cases**	**Percentage**
1) Rheumatoid Nodule	59	29.5 %
2) Interstitial lung disease (ILD)	9	4.5 %
3) Secondary Sjogren syndrome	117	58.5 %
4) Neuropathy	43	21.5 %
5) Vasculitis	3	1.5 %
6) Skin manifestations	10	5.0 %

The extra-articular manifestations were assessed on the basis of examination findings, history or imaging findings wherever available. The most common extra-articular manifestation seen in current study was of Secondary Sjogren syndrome (in 58.5% cases).

Some other manifestations were also observed in the study but are not yet proven to be extra-articular manifestations of RA. These if incidentally found or associated with RA would need larger scale study. These included hyponatremia in 2 patients, carpal tunnel syndrome in 2 patients, tendon rupture in 1 patient, lumbosacral radiculopathy in 1 patient, chronic deep vein thrombosis in 1 patient and glaucoma on 1 patient.

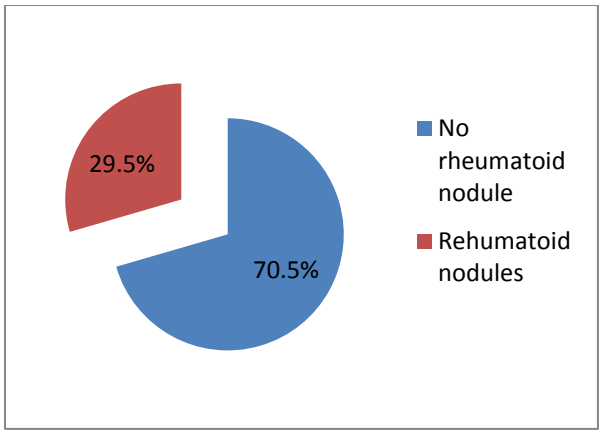

Figure 16: Number of patients with rheumatoid nodule

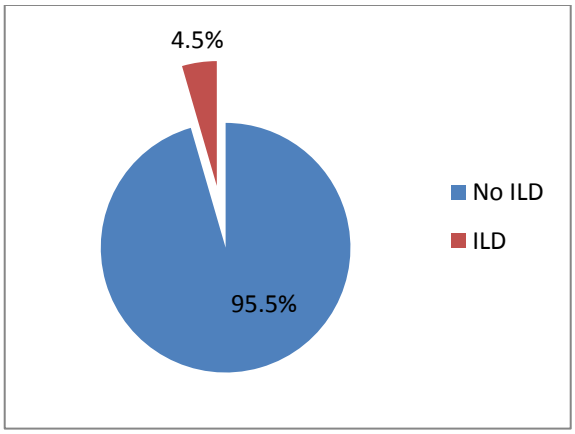

Figure 17: Number of patients with ILD

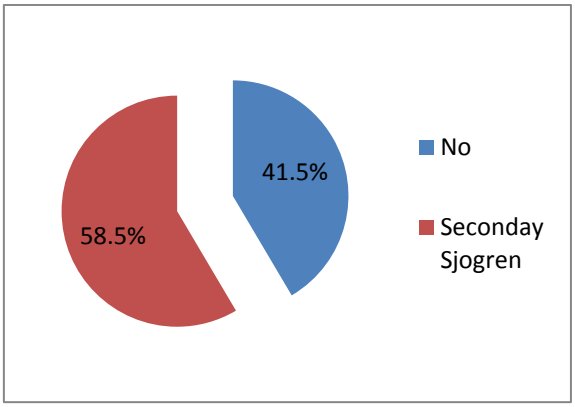

Figure 18: Number of patients with Secondary Sjogren

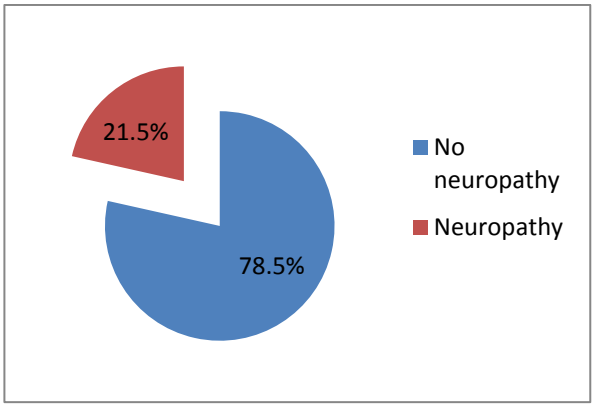

Figure 19: Number of patients with neuropathy

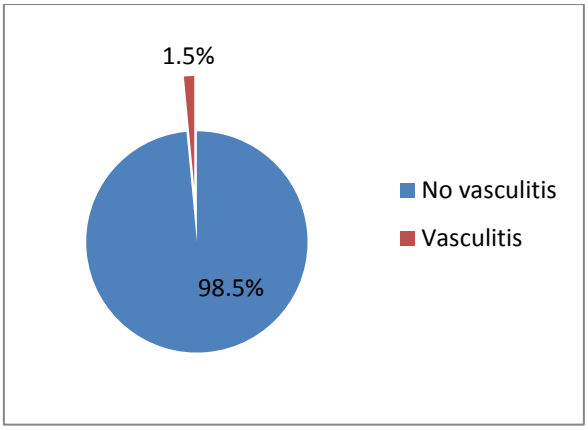

Figure 20: Number of patients with Vasculitis

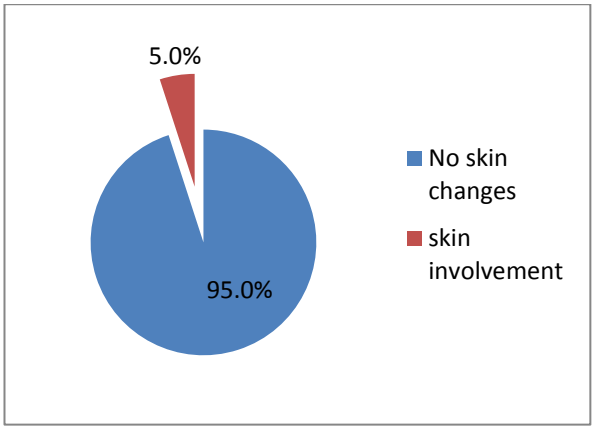

Figure 21: Number of patients with skin involvement

LAB PARAMETERS

The mean ESR value of the study is 43.17± 22.25 mm / hour.

Table 23 - Incidence of anemia in RA patients		
Hemoglobin(Hb)	**No of cases**	**Percentage**
<12 gm/dl	132	66.0%
≥ 12 gm/dl	68	34.0%

Among the lab parameters, one important and common finding was of anemia. 66% (132) patients had anemia, which accounts for almost two third of RA patients. Patients with severe anemia with Hb < 7 gm/dl were not included in the study as per exclusion criteria. Thus these 132 patients are those with mild-moderate anemia only.

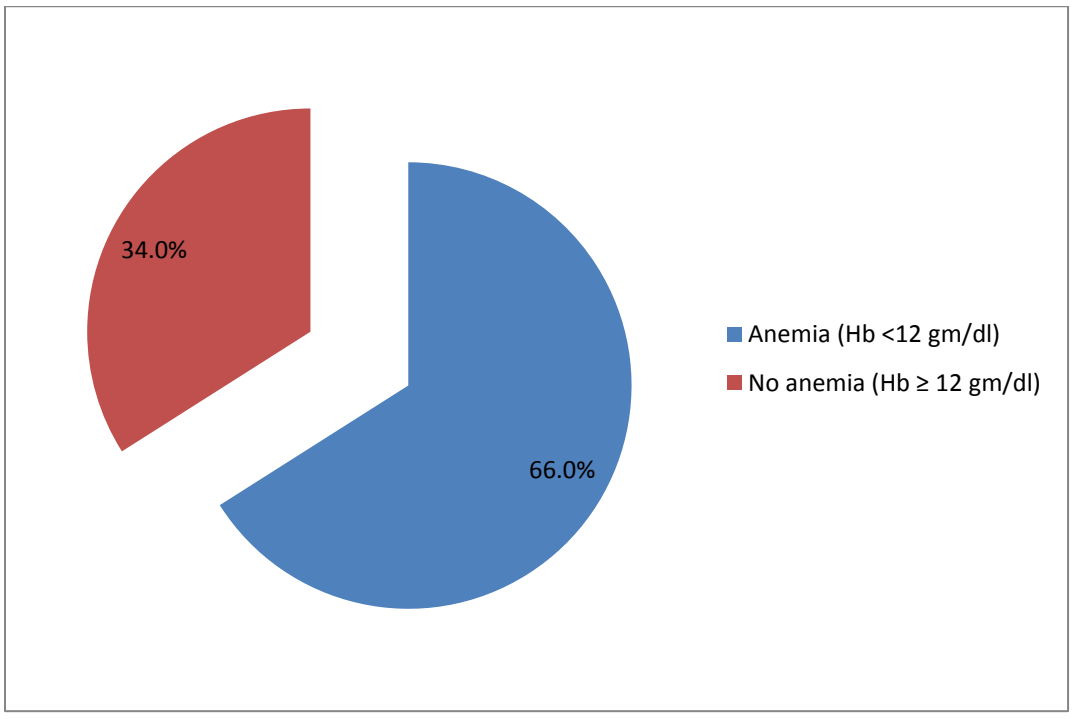

Figure 22: Distribution of anemia in patients of the study

Table 24 -Distribution of cases as per DAS-28 disease activity score		
DAS 28 GROUP	**No. of cases**	**Percentage**
Remission (0-2.6)	18	9.0%
Low disease activity (2.61-3.2)	22	11.0%
Moderate disease activity (3.21-5.1)	94	47.0%
High disease activity (5.11-9.4)	66	33.0%
Total	200	100.0%

DAS-28 ESR based score was calculated for all 200 patients and had a mean value of 4.38 ± 1.23. Based upon DAS-28 score the patients were classified into disease activity categories of remission, low disease activity, moderate disease activity and high disease activity in percentages of 9 % (18 patients), 11 % (22 patients), 47% (94 patients) and 33% (66 patients) respectively.

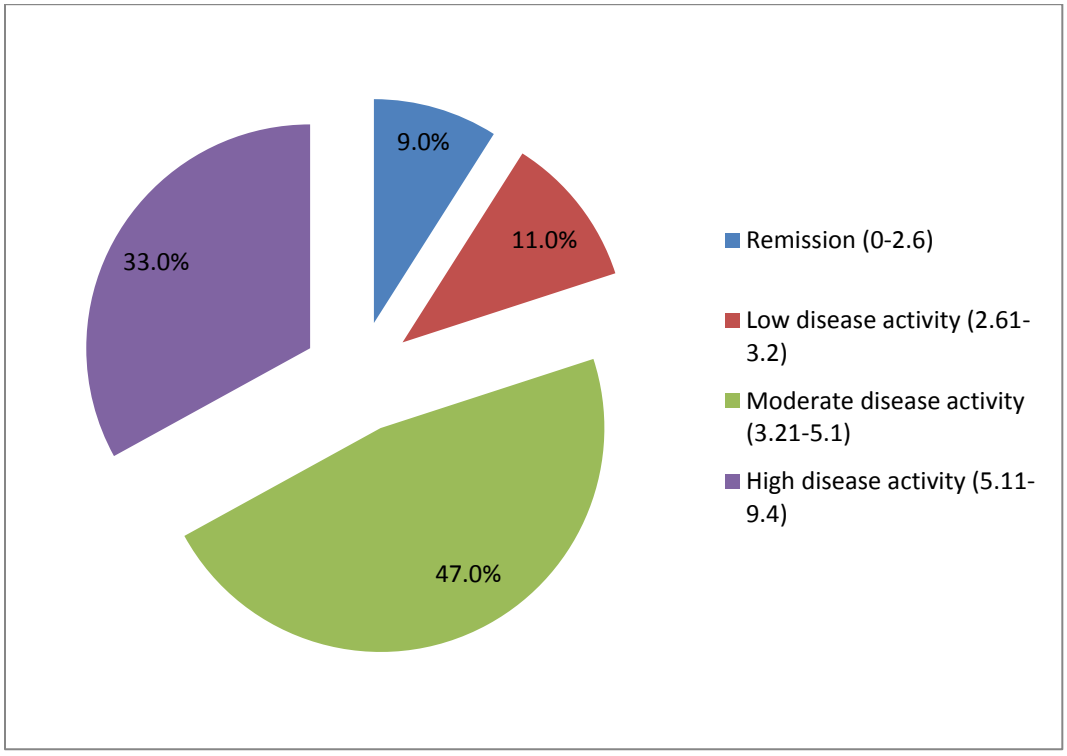

Figure 23: Distribution of cases as per DAS-28 disease activity score

Table 25- Distribution of cases as per CDAI disease activity score		
CDAI GROUP	**No. of cases**	**Percentage**
Remission (0-2.8)	12	6.0%
Low disease activity (2.9-10.0)	68	34.0%
Moderate disease activity (10.1-22.0)	89	44.5%
High disease activity (22.1-76)	31	15.5%
Total	200	100.0%

CDAI score was calculated for all patients and it had a mean value of 13.79 ± 7.81. Based upon CDAI score the patients were classified into disease severity categories of remission, low disease activity, moderate disease activity and high disease activity in percentages of 6 % (12 patients), 34 % (68 patients), 44.5% (89 patients) and 15.5% (31 patients) respectively.

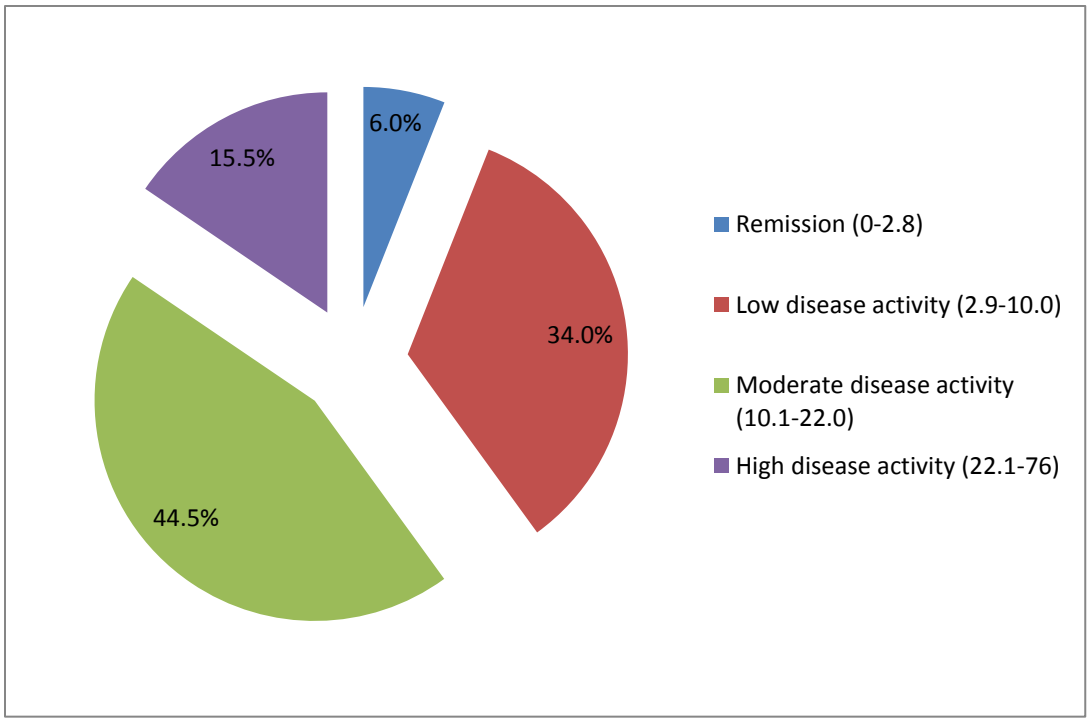

Figure 24: Distribution of cases as per CDAI disease activity score

Table 26 -Distribution of cases as per RADAI-5 disease activity score		
RADAI 5 GROUP	**No. of cases**	**Percentage**
Remission (0.0-1.4)	18	9.0%
Low disease activity (1.6-3.0)	34	17.0%
Moderate disease activity (3.2-5.4)	91	45.5%
High disease activity (5.6-10.0)	57	28.5%
Total	200	100.0%

RADAI-5 score was calculated for all patients and had a mean value of 4.3±1.74. Based upon RADAI-5 score the patients were classified into disease severity categories of remission, low disease activity, moderate disease activity and high disease activity in percentages of 9 % (18 patients), 17 % (34 patients), 45.5% (91 patients) and 28.5% (57 patients) respectively.

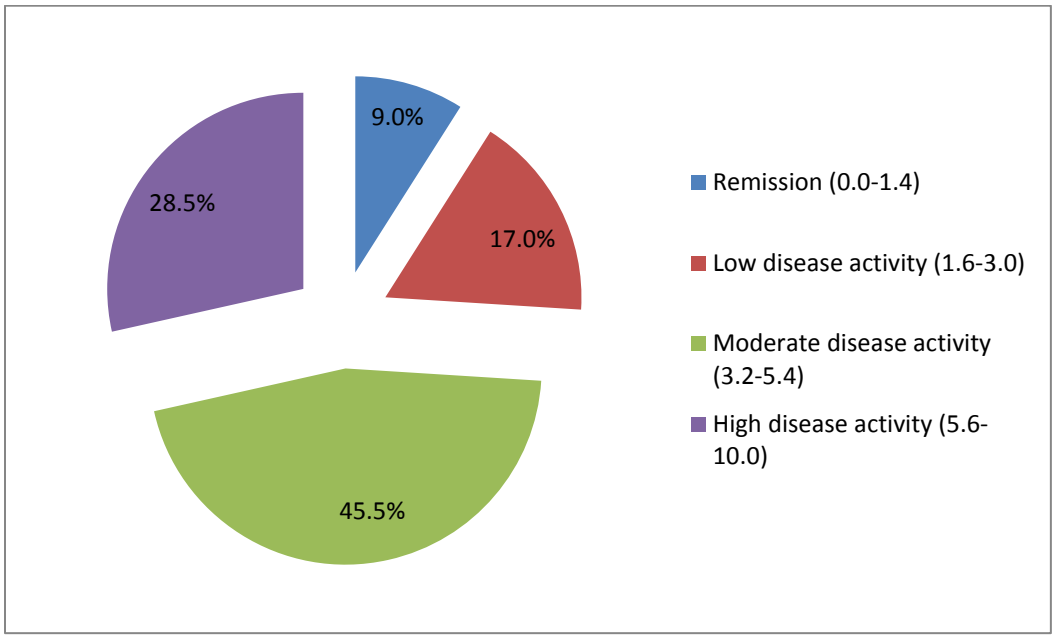

Figure 25: Distribution of cases as per RADAI-5 disease activity score

Table 27- Distribution of cases as per RAPID-3 disease severity score		
RAPID 3 GROUP	**No. of cases**	**Percentage**
Remission (≤ 3)	17	8.5%
Low disease severity (3.1-6)	14	7.0%
Moderate disease severity (6.1-12)	68	34.0%
High disease severity (>12)	101	50.5%
Total	200	100.0%

RAPID-3 score was calculated for all patients and had a mean value of 12.17 ± 5.71. Based upon RAPID-3 score the patients were classified into disease severity categories of remission, low disease severity, moderate disease severity and high disease severity in percentages of 8.5 % (17 patients), 7 % (14 patients), 34% (68 patients) and 50.5% (101 patients) respectively.

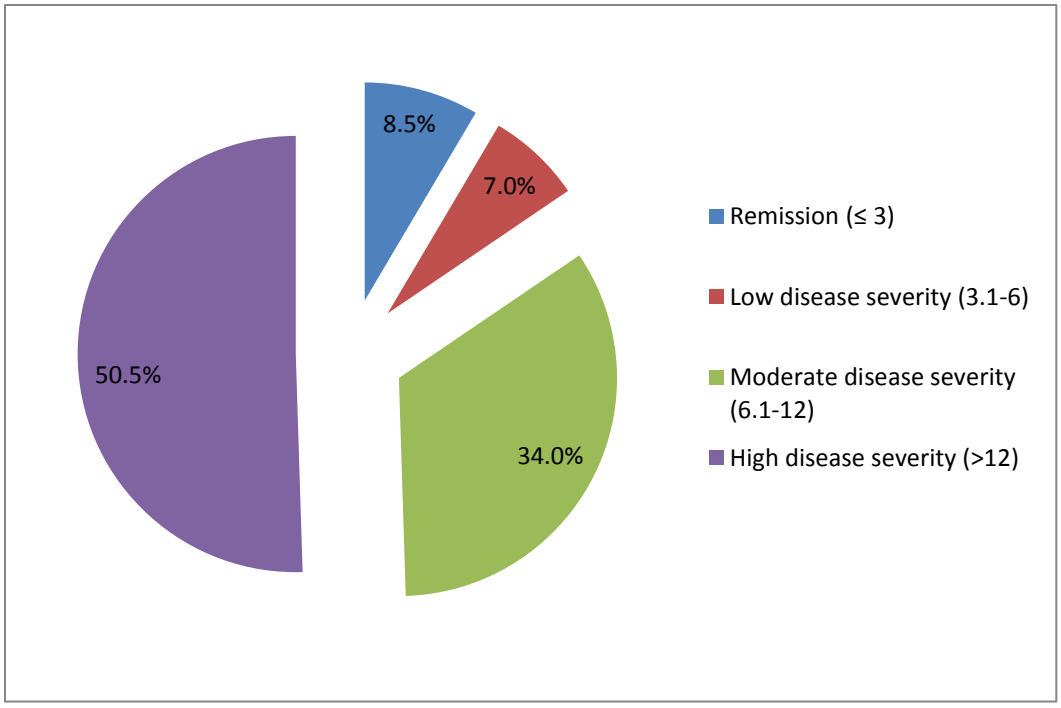

Figure 26: Distribution of cases as per RAPID3 disease severity score

Table 28 - Spearman's correlation coefficient of RADAI-5 and RAPID-3 with DAS-28 and CDAI		
Indices in evaluation	**Spearman's correlation coefficient *p* (rho)**	***P* value**
RADAI-5 with DAS-28	0.868	<0.0001
RADAI-5 with CDAI	0.869	<0.0001
RAPID-3 with DAS-28	0.862	<0.0001
RAPID-3 with CDAI	0.906	<0.0001

Spearman's correlation coefficient of RADAI-5 with DAS-28 was 0.868 at a p value of <0.0001 and of RADAI-5 with CDAI was 0.869 at a p value of <0.0001, thus suggestive of significant and strong correlation of RADAI-5 both with DAS-28 and CDAI

Spearman's correlation coefficient of RAPID-3 with DAS-28 was 0.862 at a p value of <0.0001 and of RAPID-3 with CDAI was 0.906 at a p value of <0.0001, thus suggestive of significant and strong correlation of RAPID-3 both with DAS-28 and RAPID-3.

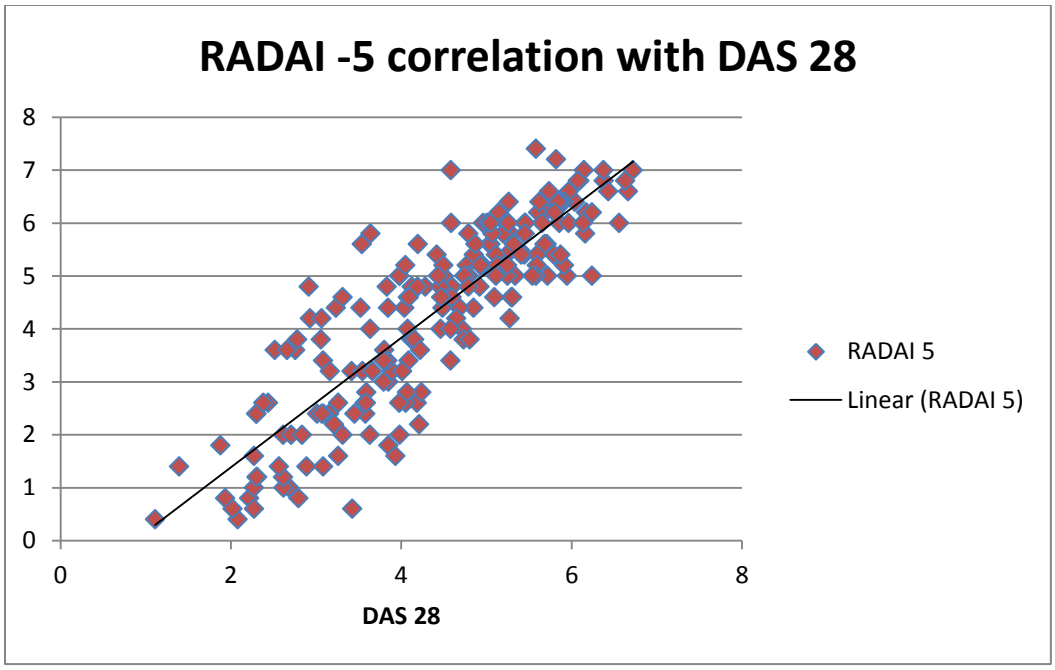

Figure 27:- Correlation of RADAI-5 with DAS-28

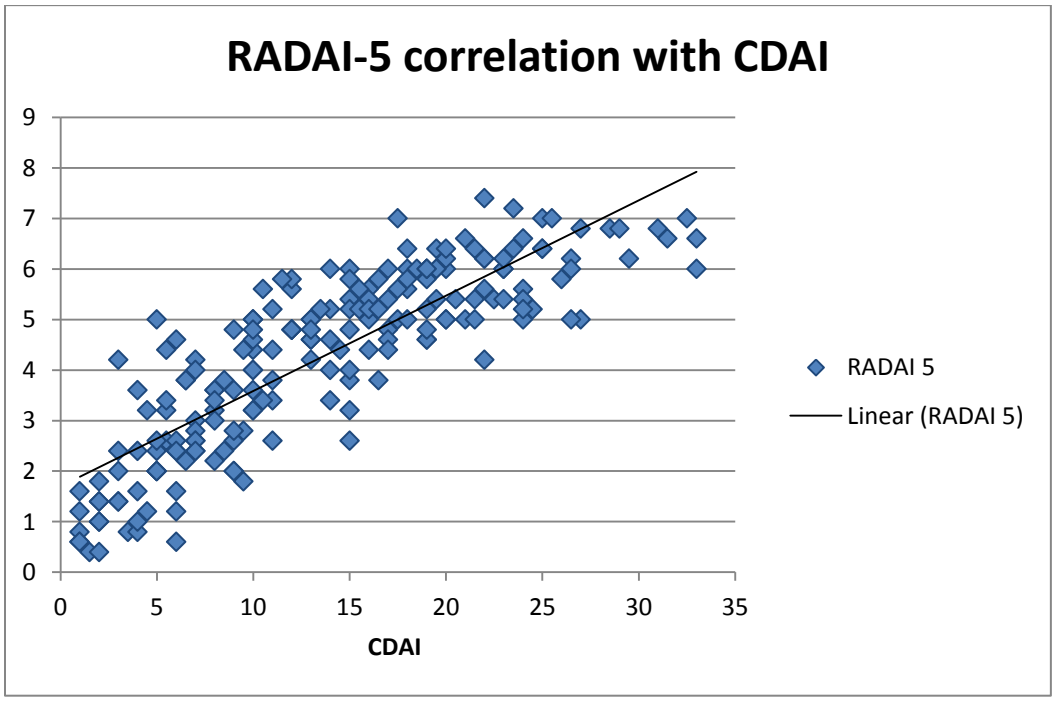

Figure 28: Correlation of RADAI-5 with CDAI

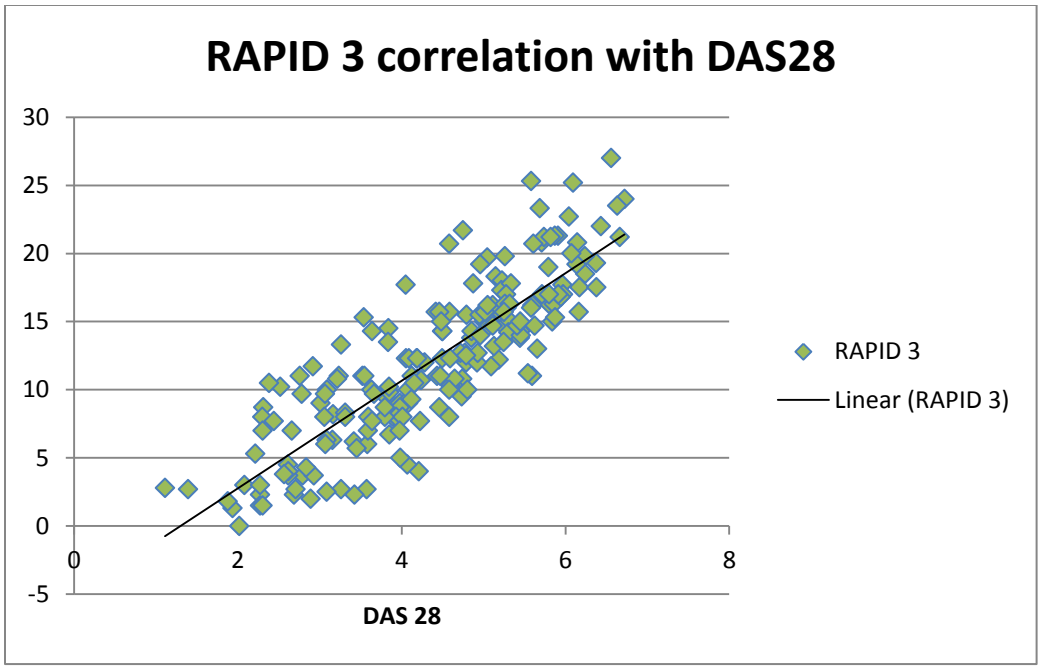

Figure 29: Correlation of RAPID-3 with DAS-28

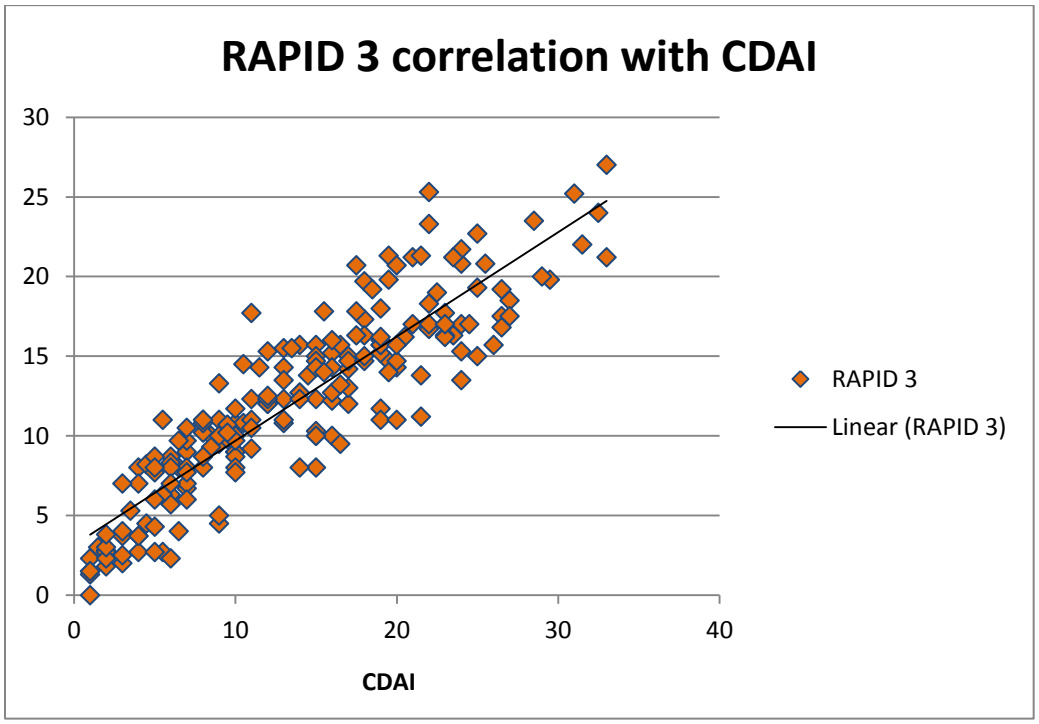

Figure 30: Correlation of RAPID-3 with CDAI

Table 29 - Agreement and kappa statistics between RADAI-5 and DAS-28								
		No of cases in RADAI-5 group				Total	Kappa value	*P*-value
		RADAI-5 remission	RADAI-5 low disease activity	RADAI-5 moderate disease activity	RADAI-5 high disease activity			
No of cases in DAS-28 group	DAS-28 remission	11	6	1	0	18	0.391	0.0001
	DAS-28 low disease activity	6	7	9	0	22		
	DAS-28 moderate disease activity	1	21	58	14	94		
	DAS-28 high disease activity	0	0	23	43	66		
Total no of cases		18	34	91	57	200		

Agreement study between RADAI-5 and DAS-28 using Cohen's Kappa statistics resulted in a kappa value of 0.391; p value 0.001, (a significant p value), thus signifying fair agreement between RADAI-5 and DAS-28.

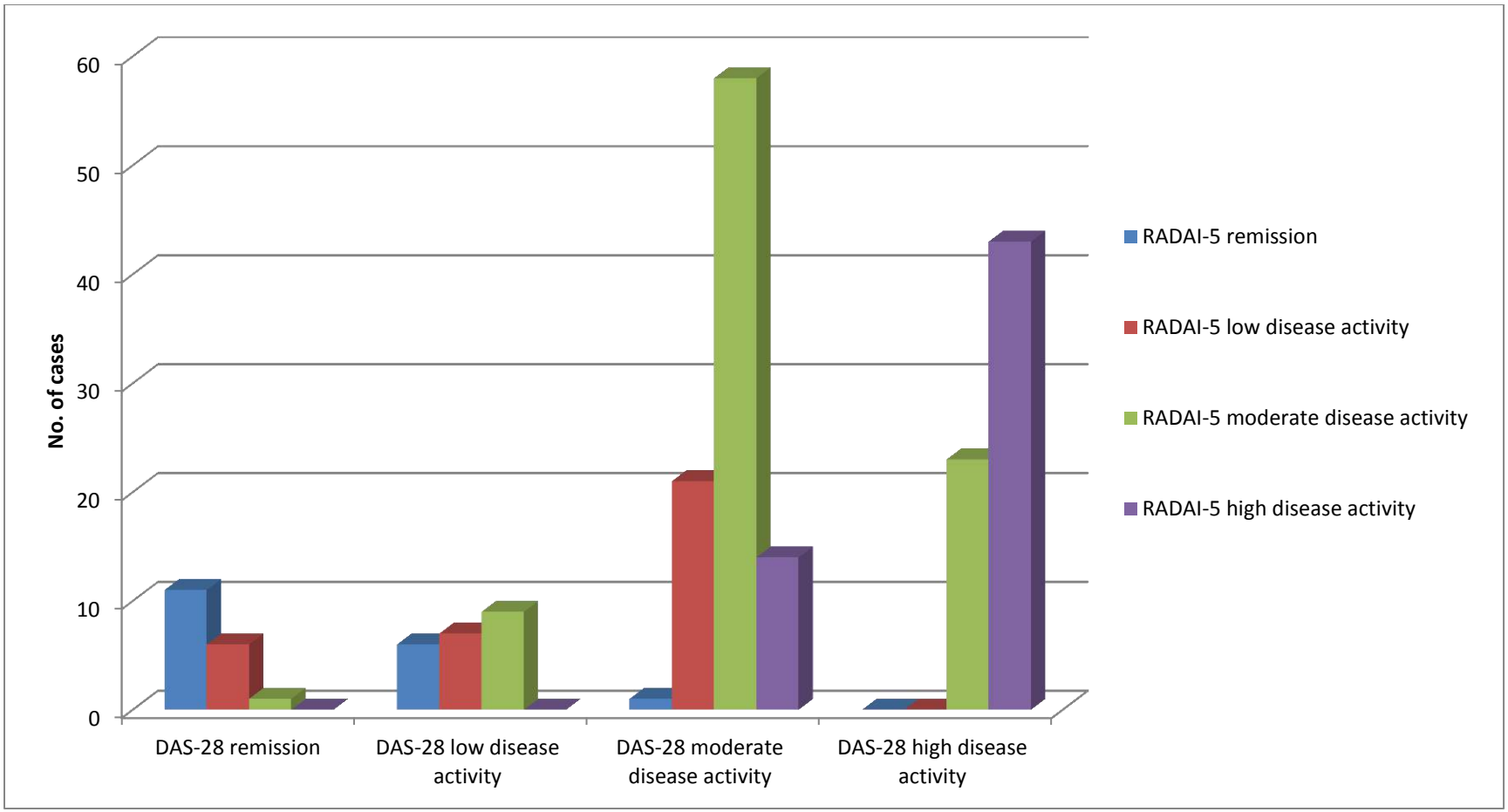

Figure 31: Agreement between RADAI-5 and DAS28 categories of RA disease activity

Table 30 -Agreement and kappa statistics between RADAI-5 and CDAI								
		No of cases in RADAI 5 group				Total	Kappa value	p-value
		RADAI-5 remission	RADAI-5 low disease activity	RADAI-5 moderate disease activity	RADAI-5 high disease activity			
No of cases in CDAI group	CDAI remission	10	2	0	0	12	0.391	0.006
	CDAI low disease activity	8	30	30	0	68		
	CDAI moderate disease activity	0	2	53	34	89		
	CDAI high disease activity	0	0	8	23	31		
Total		18	34	91	57	200		

Cohen's kappa statistics when applied between RADAI-5 and CDAI resulted in a kappa value of 0.391; p value 0.006 (a significant p value), thus signifying fair agreement between RADAI-5 and CDAI

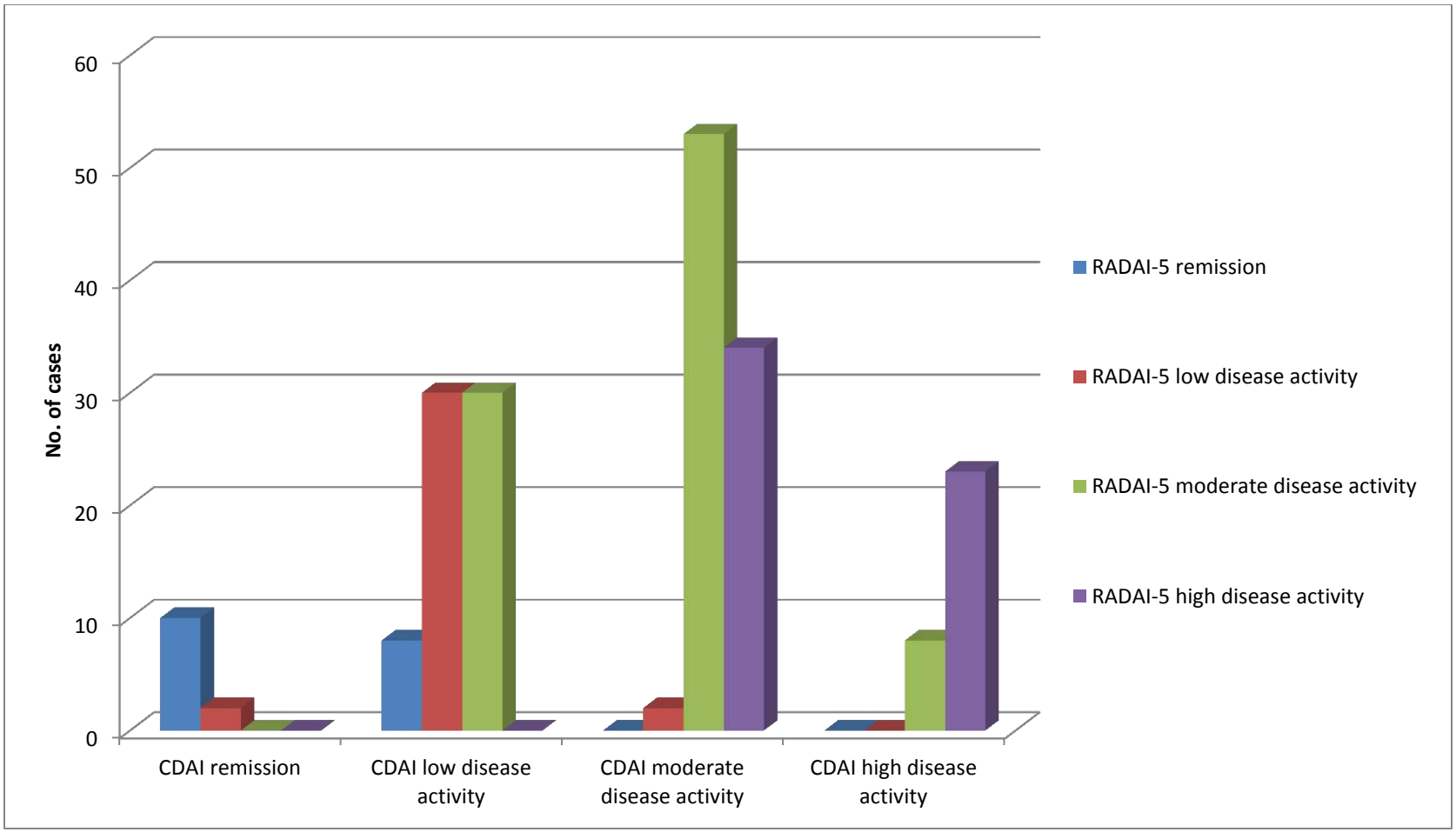

Figure 32: Agreement between RADAI-5 and CDAI categories of RA disease activity

Table 31- Agreement and kappa statistics between RAPID-3 and DAS-28								
		No of cases in RAPID 3 group				Total	Kappa value	p-value
		RAPID-3 remission	RAPID-3 low diseaes severity	RAPID-3 moderate disease severity	RAPID-3 high disease severity			
No of cases in DAS 28 group	DAS-28 remission	10	2	6	0	18	0.468	0.0001
	DAS-28 low disease activity	4	7	11	0	22		
	DAS-28 moderate disease activity	3	5	49	37	94		
	DAS-28 high disease activity	0	0	2	64	66		
Total		17	14	68	101	200		

Kappa statistics when applied between RAPID-3 and DAS-28 resulted in a kappa value of 0.468 ; p value 0.0001 (a significant p value), thus signifying moderate level of agreement between RAPID-3 and DAS-28.

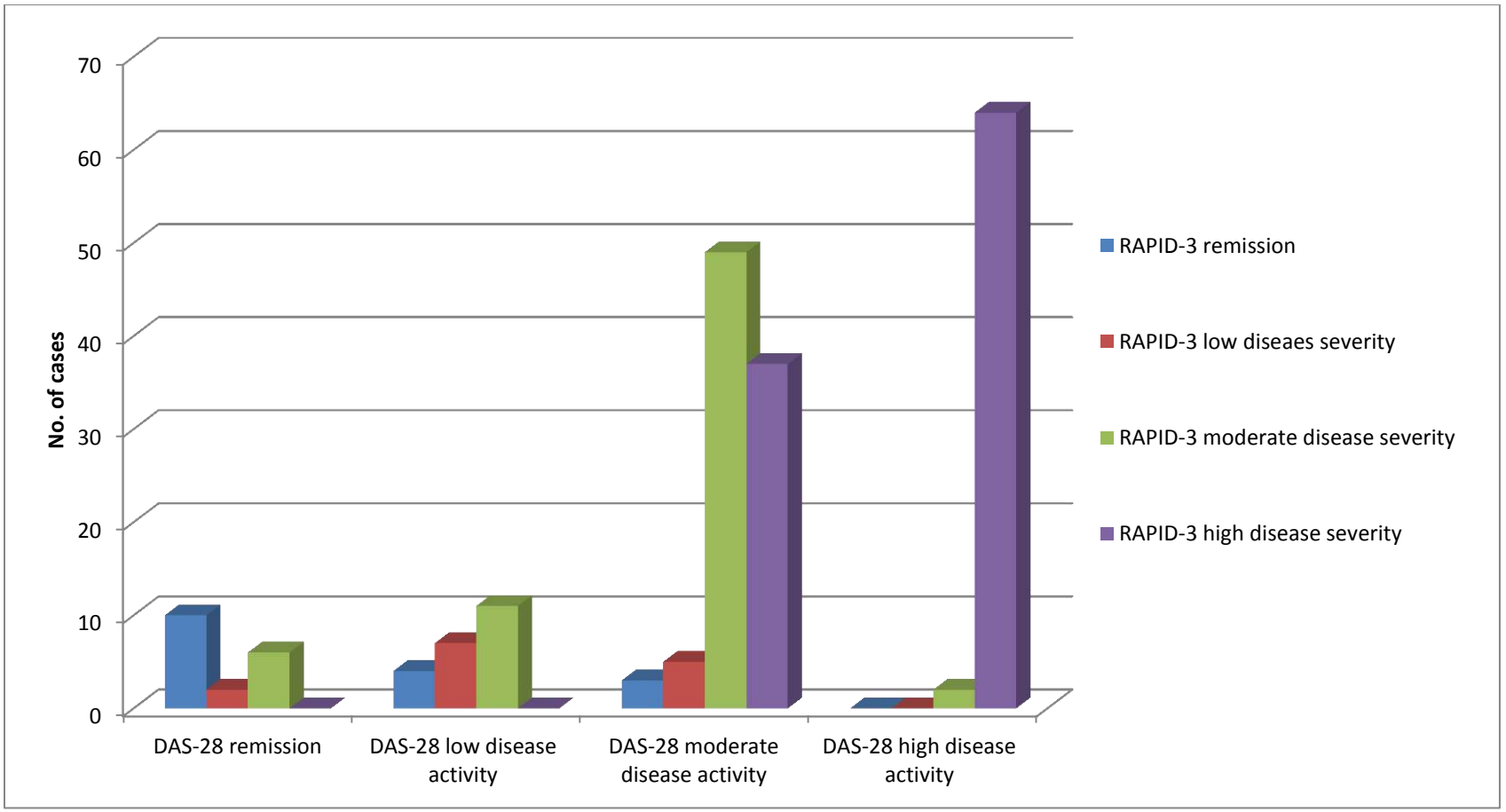

Figure 33: Agreement between RAPID3 and DAS28 categories of RA disease severity/activity

Table 32- Agreement and kappa statistics between RAPID-3 and CDAI								
		No of cases in RAPID 3 group				Total	Kappa value	p-value
		RAPID-3 remission	RAPID-3 low disease severity	RAPID-3 moderate disease severity	RAPID-3 high disease severity			
No of cases in CDAI group	CDAI remission	11	1	0	0	12	0.157	0.0001
	CDAI low disease activity	6	13	48	1	68		
	CDAI moderate disease activity	0	0	20	69	89		
	CDAI high disease activity	0	0	0	31	31		
Total		17	14	68	101	200		

Kappa statistics when applied between RAPID-3 and CDAI resulted in a kappa value of 0.157; p value 0.0001 (a significant p value), thus signifying slight agreement between RAPID-3 and CDAI

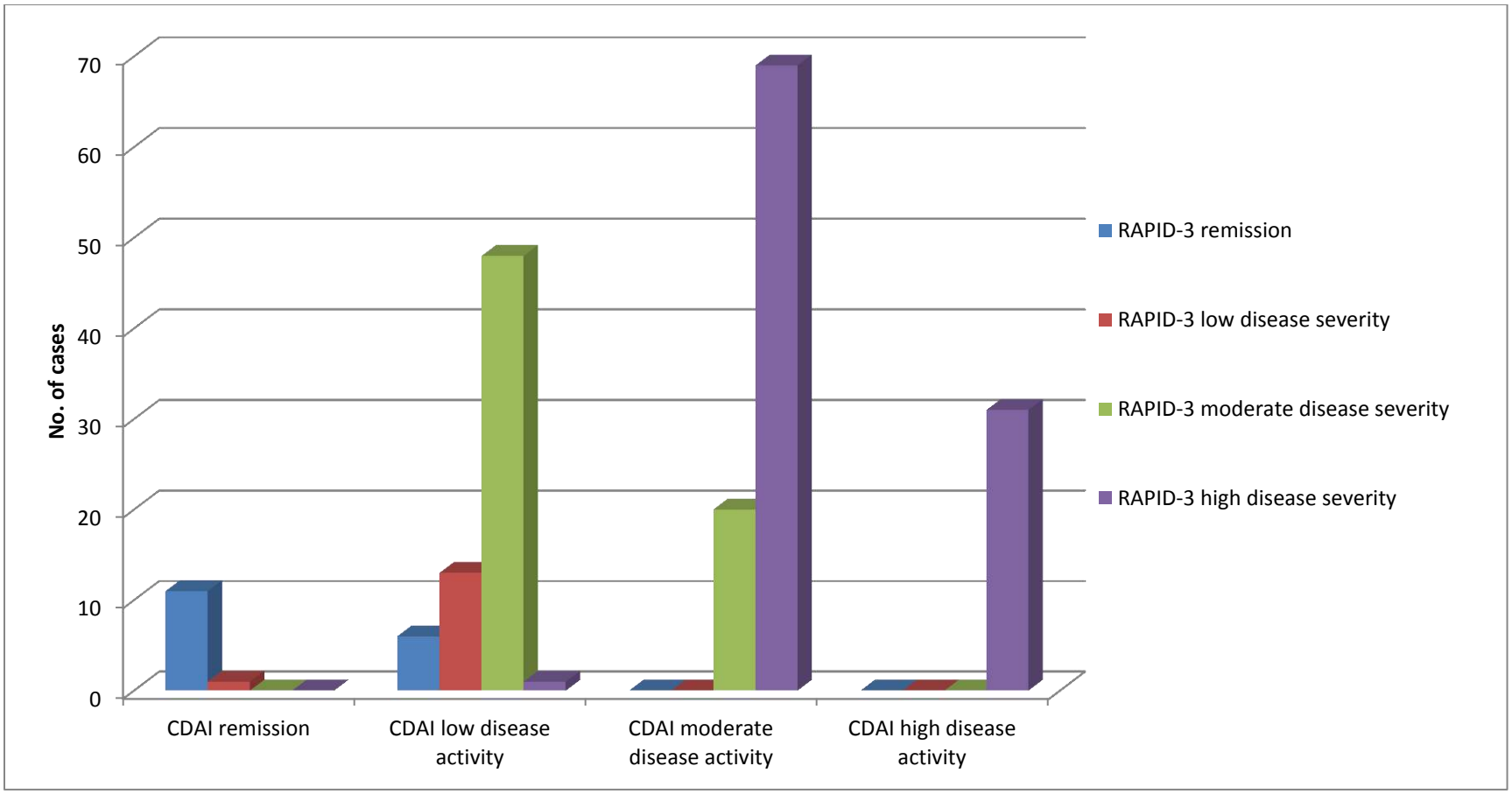

Figure 34: Agreement between RAPID3 and CDAI categories of RA disease severity/activity

DISCUSSION

RA is a chronic inflammatory and autoimmune disorder which manifests clinically with articular as well as extra-articular symptoms, and is multisystemic in nature. It not only affects the joints but also the overall health and well being of the patient, owing to its multisystemic nature and associated morbidity. It is commonly encountered by physicians and affects about 0.75% of adult population in India.[6] It has a fluctuating course with episodes of exacerbations or flare of the disease. Early treatment initiation/modification in response to an exacerbation/flare can result in better outcome and prevent disabling joint deformities. Also establishment of remission in RA is one of the goals of treating RA patients. Assessment of achieved remission in RA also has significance in treatment decision. Thus frequent and timely assessment of disease activity in RA is a cornerstone of treating Rheumatoid arthritis. "Treat to target" approach[35] is now gaining acceptance which requires regular disease activity assessment and quantification. Thus various scales[32] have been developed for assessing the disease activity. Conventionally, the two most widely used scale for this purpose are DAS-28 and CDAI, which are based on formal joint count assessment done by the physician which is time consuming and not practical in a busy OPD, particularly in a country like India where the disease burden is high. Also, DAS28 requires ESR value for its calculation. Recently, there has been increased emphasis on measurement of disease activity as assessed directly from the patient, without interpretation from the physician i.e. Patient Reported Outcomes (PROs).[68] Various new induces have been developed, two of them being RADAI-5 and RAPID-3. These are patient based questionnaires and are quick to administer, do not require any blood test or TJC/SJC. The RAPID 3 and RADAI-5 scoring systems have not yet been studied in Indian Punjabi population. This study aimed to find the correlation of RADAI-5 and RAPID3 with DAS28 and CDAI. First RADAI-5 was translated to Punjabi language using appropriate methodology and

then validated for initial 2 months in 45 patients and hence a Punjabi version of RADAI-5 was synthesized. Correlation was then assessed for Punjabi version of RADAI-5 and RAPID-3 with DAS-28 and CDAI.

Validation of RADAI-5 in Punjabi language for use in Indian Punjabi population

RADAI-5 was translated to Punjabi language using standard methodology. Since it is a new synthesized form of RADAI-5 first it was evaluated for its psychometric parameters and validity in 45 patients during first 2 months of study. Patients completed proforma for DAS28, RADAI-5 and RAPID-3. Statistical analysis were applied to the data collected from these 45 patients to assess the psychometric properties of newly synthesized Punjabi version of RADAI-5 and their results interpreted.

Feasibility – Punjabi version of RADAI-5's feasibility was checked by analysing the floor and ceiling effect. The minimum and maximum possible score values for RADAI-5 are 0 and 10 respectively. Our validation study amongst 45 patients had minimum and maximum value as 0.4 (in a single patient) and 6.8 (in a single patient) respectively. No patients had the possible minimum and maximum score. Since the percentage of patients having the lowest and highest possible score is < 15%,[82] it was concluded that there was no floor or ceiling effect in Punjabi translated version of RADAI-5. Thus it can be stated that Punjabi translated RADAI-5 is a feasible questionnaire to administer. Almost similar to our intent, Ismihan Sunar et. al[54] carried out translation and validation of Turkish language version of RADAI-5 in 2014. They also used floor ceiling effect as feasibility check tool and found Turkish version to be a feasible questionnaire. Also Punjabi version of RADAI-5 was cost effective, easy and quick to administer and was completely answered by all patients irrespective of their education level without any difficulty in understanding any of the questions .Thus Punjabi version of RADAI-5 is feasible.

Reliability - Since this was a single time cross-sectional study, reliability

of Punjabi version of RADAI-5 was evaluated on the grounds of internal consistency, computed using Cronbach's alpha. It came out to be 0.745, which is a good level of internal consistency.[80] This value of Cronbach's alpha signifies that the questions of Punjabi version of RADAI-5 have inter relatedness amongst themselves, have a homogenous construct and are not redundant. So, Punjabi version of RADAI-5 is reliable.

Validity –This psychometric property of Punjabi version of RADAI-5 was evaluated on various fronts.[83] Criterion validity was assessed by correlation of Punjabi version of RADAI-5 with DAS-28 and CDAI (as DAS28 and CDAI are universally accepted RA disease activity indices) using spearman correlation statistics. The spearman correlation coefficient for Punjabi version of RADAI-5 with DAS-28 and CDAI for validation phase of study came out as 0.835 (p value <0.0001) and 0.797 (p value <0.0001) respectively. These both values indicate a significant correlation of Punjabi version of RADAI-5 with DAS-28 and CDAI.[76] Construct validity was assessed using the method of convergent validity, for which correlation between score of Punjabi version of RADAI-5 and ESR, SJC, TJC, PGA and EGA (parameters reported to be related with disease activity of RA) was assessed using spearman correlation coefficient and their values came out as 0.650 (*p* value = <0.0001), 0.567(*p* value = <0.0001), 0.764 (*p* value = <0.0001) , 0.758 (p value = <0.0001) and 0.779 (p value = <0.0001) respectively. All suggestive of significant positive correlation with Punjabi RADAI-5, with highest being for EGA followed by TJC among these 5 parameters. ESR, TJC, EGA, PGA had strong significant correlation with RADAI-5 while SJC was shown to have moderate significant correlation with RADAI-5. Our results were in close proximity to those of Ismihan Sunar et al[54] in which ESR and SJC had relatively lower spearman value of 0.48 and 0.56 (both with *p* value <0.0001) for correlation with Turkish version of RADAI-5. The spearman correlation with PGA, EGA and TJC had values of 0.72, 0.84 and 0.75 respectively (all with p value = <0.0001). This proves the construct validity

of Punjabi version of RADAI-5. Content validity was also present as the 5 questions of Punjabi RADAI-5 tend to cover different domains of disease activity in patients of RA. It also has face validity as it is a scoring based questionnaire having rating for all 5 questions from 0 to 10, and meaning of score 0 and 10 being given for each question in the questionnaire itself. After thoroughly evaluating Punjabi version of RADAI-5 on various fronts, its validity was established.

Our study was a cross sectional study and test-retest reliability and response to treatment was not evaluated.

Punjabi version of RADAI-5 was evaluated for its various psychometric properties and using these results it is concluded that Punjabi version of RADAI-5 is a feasible, reliable and valid questionnaire which is easy to administer and can be used in RA patients to assess their disease activity.

TO STUDY THE CORRELATION AND CONCORDANCE OF RAPID 3 AND RADAI-5 WITH DAS28 AND CDAI:

Once Punjabi version of RADAI-5 was validated, a comparative study of disease activity indices of Punjabi version of RADAI-5 and RAPID-3 with DAS-28 and CDAI was carried out in 200 patients coming to the OPD.

The mean age of the 200 study group was 47.65 ± 12.15 years and majority of them were females i.e. 85.5 % (171 cases) and only 14.5 %(29 cases) were male. This indicates the female preponderance of RA. This is in concordance with previous studies like that of Harpreet Singh et al[50] carried out in Haryana in 2017 amongst 100 patients in which 81% were female and 19 % were male and mean age was 44.4 ± 11.8 years.

Since education level can impact the ability to read, answer the questionnaire, this demographic parameter was also recorded. In our study 15 % were uneducated, 12 % studied till primary level (class 1-5), 39 % till secondary level (class 9-10), 18.5 % till higher secondary (class 11-12), while 2% were still studying. 1% completed their education till

Diploma, 9.5 % till graduation and 3% till Post graduation. Impact of education in ability to understand the question was overcome by translation of RADAI-5 to Punjabi language.

The mean disease duration in our study was 6.75 ± 6.06 years with 16% (32 patients) cases having RA for duration of < 2 years, 59.5% (119 patients) cases having RA for 2 to < 10 years and 24.5% (49 cases) having RA for ≥ 10 years. The mean RA duration was higher in some studies on RA disease activity indices like in Marie Bossert's study[53] and Ismihan Sunar's study[54] disease duration was 13 ± 8.3 years and 13.6 ± 8.1 years, respectively. In an observational study carried out in 63 patients in a tertiary care hospital in Pakistan by Taqdess Khaliq et al[84] the mean RA duration was 5.05 ± 0.99 years. Disease duration of RA can impact the outcome in RA as patients with long standing RA tend to have less improvement in HAQ[85] than those having early RA .

In our study, 86% (172 cases) were seropositive and 14 % (28 cases) were seronegative. Similar proportion of seropositivity was seen in study by Ksir Salma et al[86] amongst 294 RA patients where 90% patients were seropositive and 10% were seronegative.

Our study group included 36.5% (73 patients) who had deformities of RA while the rest did not. An observational study in southwestern India by Anil Kumar AVS et al[87] had higher proportion of deforming RA upto 64 % in patients visiting a tertiary care hospital.

In our study 14.5 % (29) patients had family history of RA with 26 patients giving history of RA in first degree relative,5 in second degree and 1 in third degree. The most common relative having positive family history of RA was mother in 16 patients. Similar results were seen in a study by Koichi Murata et al[88], where 11.9 % (31 patients) out of 260 newly diagnosed had family history of RA upto second degree signifying genetic inheritance of RA.

Amongst prevalence of other co-morbidities in RA patient in our study, hypertension was seen to be the most common (16.5% or 33 patients) followed by hypothyroidism (11.5 % or 23 patients) , diabetes mellitus (9% or 18 patients). Other co-morbidities had minor frequency of occurrence . This studied excluded patients with pre-existing cardiac, renal, liver or pulmonary disease. Similarly, Al bishari et al[89] found existence of co-morbidities in 66% patients with hypertension being the commonest occurring in 35.9 % of 340 patients followed by diabetes mellitus in 30.9 % and then the others . Similarly, Lena Innala et al[90] quoted in their study that 53.2% patients had one or more co-morbidity at disease onset with hypertension being commonest (27.3%) followed by obstructive lung disease (13.9%), diabetes (8%), hypothyroidism (6.3%).Some other studies reported cardiovascular disease as most common comorbidity[91] followed by respiratory and then others. The existence of comorbidity can influence the PROs scale scores.

Out of 200 patients of RA, only 1 % (2 patients) gave history of smoking. Smoking has been previously studied to be a strong predisposing risk factor for RA[12] but its prevalence was quite low in our section of study group.

Amongst the extraarticular manifestations in the present study, we found secondary Sjogren to be very common with occurrence in 58.5 % (117 patients). Rheumatoid nodules were also seen commonly i.e. in 29.5% patients. The next frequent manifestations in order were neuropathy in 21.5%, skin manifetstation (leg ulcers, digital gangrene, pigmented purpuric dermatosis) in 5 %, ILD in 4.5 % and vasculitis in only 1.5 % patients. Other manifestation like carpal tunnel syndrome, tendon rupture etc were seen in very few patients. Whereas Manole Cojocaru et al [92] reported nodules to be the commonest extra-articular manifestation occurring in 30 %, while Sjogren's syndrome, anemia, and pulmonary

involvement were seen in 6 – 10 % patients of early RA and are associated with worse outcome in long run.

Anemia in RA patients was highly prevalent as per the present study. Out of 200, 66% (132 patients) had hemoglobin < 12 gm/dl. This data does not include those with hemoglobin < 7 gm/dl as it was the exclusion criteria since very severe anemia can add to morbidity/ fatigue and hence raise severity scores on PRO's based scales. Other Indian studies found a similar percentage of anemia in RA patients while foreign studies have reported lesser incidence. Laxmikant Goyal et al[93] evaluated 59 RA patients with disease duration < 2 years, and anemia was found in 67.8 % (40 patients) and also stated that hemoglobin has significant negative correlation with DAS-28 score. Another Indian study by Sumeet Agarwal et al[94] stated anemia as a frequent extra-articular manifestation and significant iron deficiency anemia was seen in nearly half of patients.

The mean ESR value of our study is 43.17 ± 22.25 mm/hour.

Amongst the patient perceived cause of flare, 8.5 %(17 patients) cases reported winters as the exacerbating cause. 2.5 % perceived change of weather as cause of disease flare. 6.5 % patients perceived overexertion or fatigue as cause of flare. While 3% patients related it to dietary items. 2 females reported flare in post partum period. One patient each perceived missing medication, stress, morning time and rest as cause of flare. This was similarly reported in the study by Pradnya M Diggikar et al[95] in which 100 patients in Pune were enrolled and the commonest cause of exacerbation was climatic change.

DAS-28, CDAI, RADAI-5 and RAPID-3 were calculated for all 200 patients and their correlation studied using appropriate statistics.

DAS-28 ESR based score was calculated for all 200 patients and had a mean value of 4.38 ± 1.23. Based upon DAS-28 score the patients were classified into disease activity categories of remission, low disease

activity, moderate disease activity and high disease activity which were 9 % (18 patients) , 11 % (22 patients), 47% (94 patients) and 33% (66 patients) respectively. Maximum number of patients were thus having moderate disease activity. DAS-28 is one of the most widely used index worldwide for disease activity assessment. It requires lab values of ESR and physician based assessment of TJC and SJC of 28 joints. Thus calculating DAS-28 is time consuming and requires a trained physician to carry out TJC, SJC which may not be possible everytime in a busy OPD. Also DAS-28 score gives 15 % contribution to ESR,[45] which can be elevated due to some other coexisting disease. Also it gives more weightage to TJC than SJC while clinicians tend to weigh SJC as more important.[96] Thus other disease severity indices are being developed and most of them have been compared to DAS-28 to study their validity.

CDAI score was calculated for all 200 patients and the mean CDAI was 13.79 ± 7.81. When classified as per disease activity scale, 6% (12 patients) were in remission, 34% (68 patients) were having low disease activity, 44.5% (89 patients) were found to have moderate disease activity and 15.5% (31 patients) were having high disease activity. Thus according to CDAI also maximum patients of the study were in moderate disease activity category with also large number of patients in low disease activity category. It also includes physician based assessment of 28 joints for SJC, TJC but no lab tests. It also has been widely used worldwide since many years to assess the severity of disease. Various studies have shown significant correlation between CDAI and DAS-28.Since it also involves SJC and TJC, formal joint count is required for its assessment, which is time consuming and carries administrative burden. Thus paving in way for new indices which are more quickier and easier to perform. CDAI also has been used to compare various new disease activity indices along with DAS-28.

All 200 patient completed the RADAI-5 questionnaire (Punjabi version) and their sores calculated. The mean RADAI-5 score of our study is 4.30 ± 1.74 . Similar mean value of RADAI-5 value of 4.2 ± 1.7 was reported in study by Shereen R Kamel et al[49] and 4.3 ± 2.4 in the study by Ismihan Sunar et al[54] on Turkish version of RADAI-5. When 200 patients in our study were grouped according to disease severity as per RADAI-5 score, 9 % (18 patients) were classified to be in remission, 17 % (34 patients) as having low disease activity, 45.5% (91 patients) as having moderate disease activity and 28.5% (57 patients) as having high disease activity. Thus maximum number of patients were having moderate disease activity as per RADAI-5 score.

Then RADAI-5 was compared for correlation and agreement with DAS-28 and CDAI using spearman's coefficient and kappa statistics respectively. We obtained the following results. Spearman correlation coefficient of RADAI-5 with DAS-28 was 0.868 (*p* value= <0.0001) and for RADAI-5 with CDAI was 0.869 (*p* value= <0.0001). Both these values suggest very strong correlation.[76] When evaluated for agreement with the conventional indices, concordance between different severity classes as per two scales was assessed with Cohen's kappa statistic. The kappa value for agreement between RADAI-5 and DAS-28 was 0.391 (p value= 0.001) and for agreement between RADAI-5 and CDAI was 0.391 (p value= 0.006) both having a significant p value and indicating fair level of agreement of RADAI-5 with DAS-28 and CDAI[81] Thus Punjabi translated RADAI-5 is inferred to have very strong positive correlation with DAS-28 and CDAI and is in agreement / concordance with DAS-28 and CDAI.

Present results are comparable to previous available results of comparative studies from different parts of the world. Vikram S Tanwar et al[52] in a 3 month follow up study amongst 100 RA patients reported significant correlation of RADAI-5 with DAS28 and CDAI with spearman coefficient at baseline and then at 3 months to be 0.862, 0.942, 0.856 and

0.938 respectively, all with p value <0.001. Kappa value of RADAI-5 at baseline evaluation and at 3 month interval with DAS-28 and CDAI were 0.563, 0.411, 0.545 and 0.574 respectively, all with *p* value <0.001, indicative of average and significant agreement with DAS28 and CDAI, respectively.

In a study of 169 OPD patients by the developer of RADAI-5 Burkhard F Leeb et al[48], the spearman coefficient between RADAI-5 and DAS-28 was 0.638 and spearman coefficient between RADAI-5 and CDAI was 0.740, both with p value <0.001, suggestive of statistically significant correlation. Kappa value between RADAI-5 and DAS-28 was 0.290 and kappa value between RADAI-5 and CDAI was 0.369 suggestive of fair and statistically significant agreement, like our present study.

Marrie Bossert et al[53] also stated similar conclusion from their cross sectional study on 200 patients. Spearman coefficient of RADAI-5 with DAS28 and with CDAI were 0.662 and 0.743 respectively, showing significant correlation

Harpreet Singh et al[50] inferred RADAI-5 to be correlating to DAS28 and CDAI with spearman coefficient of RADAI-5 to be 0.862 with DAS-28 and 0.856 with CDAI, both p value <0.001

The mean RAPID-3 value for 200 OPD patients in this present study was 12.71 ± 5.71. Based upon RAPID-3 score severity classification, 8.5 % (17 patients) were classified to be in remission, 7 % (14 patients) as having low disease severity, 34% (68 patients) as having moderate disease severity and 50.5% (101 patients) as having high disease severity. The maximum number of patients were in high disease severity group as per RAPID-3 scoring. Then RAPID-3 was compared for correlation and level of agreement with DAS-28 and CDAI using spearman's coefficient and kappa statistics respectively.

The spearman's correlation coefficients of RAPID-3 with DAS-28 was 0.862 and for RAPID-3 with CDAI was 0.906, both with p value <0.0001. Thus proving very strong and significant correlation of RAPID-3 with DAS-28 and CDAI both.

For level of agreement kappa value of RAPID-3 and DAS-28 came out as 0.468, p value 0.0001 indicating moderate level of agreement of RAPID-3 and DAS-28. Kappa value of RAPID-3 and CDAI came out as 0.157, p value 0.0001 indicating slight but significant level of agreement of RAPID-3 and CDAI.

Previously, two studies had reported higher kappa value and hence higher level of agreement than that of our present study. Harpreet Singh et al[63] evaluated 200 patients and reported substantial agreement of RAPID-3 with DAS-28 with kappa of 0.634 (p value <0.001) and between RAPID-3 with CDAI with kappa of 0.690(p value <0.001). Spearman coefficient being 0.910 (p value <0.0001) and 0.907 (p value <0.0001) for RAPID-3 with DAS-28 and CDAI, respectively. Also Amit kumar et al[60] carried out a study in West Bengal in 105 patients and evaluated them at 0, 2 and 4 months and concluded spearman coefficient of RAPID-3 with DAS28 and CDAI to be 0.995 and 0.943 (both with p value <0.001) respectively and stated kappa value of RAPID-3 with DAS-28 as 0.959 (p value <0.0001) and RAPID-3 with CDAI as 0.931(p value <0.0001) , hence higher agreement.

Other than these two studies, rest available studies had kappa agreement statistics value similar to our present study.

Similar to the present study, the kappa values obtained in the study by Theodore Pincus et al[56] carried out in 285 RA patients were suggestive of fair agreement level. Spearman coefficient of RAPID-3 with DAS-28 was 0.66 (p value <0.001) and of RAPID-3 with CDAI was 0.74 (p value

<0.001). Kappa value of RAPID-3 with DAS-28 was 0.26 and of RAPID-3 with CDAI was 0.32.

Theodore Pincus et al[65] carried out another study in two parts by 4 rheumatologists in 200 patients which yielded results stating spearman correlation coefficient for RAPID-3 with DAS-28 to be 0.43 with p value <0.001 and for RAPID-3 with CDAI to be 0.61 with p value < 0.001 indicating significant correlation especially at higher disease activity. Kappa agreement statistic when applied resulted in kappa value of 0.16 for RAPID-3 with DAS-28 and kappa value of 0.27 for RAPID-3 with CDAI, thus showing slight agreement with DAS-28 and fair agreement with CDAI.

Results of Siddhartha Kumar et al[59] were suggestive of lesser level of agreement of RAPID-3 with DAS-28 than the present study results. The spearman coefficient in their study for RAPID-3 with DAS-28 was 0.404 (p value <0.001) and their kappa agreement statistic was less robust being 0.072 (p value <0.001).

Similar results were obtained in a Ecuadorian study by Maria Fernanda Zurita et al.[62] They concluded that RAPID-3 can be scored in 10 seconds and RAPID3 correlated best with DAS28 with spearman coefficient of 0.83 (p < 0.001), followed by CDAI (spearman coefficient of 0.80, p < 0.001) and then with SDAI (spearman coefficient of 0.77, p < 0.001). In a cross sectional study of 200 patients by Marrie Bossert et al[53], the spearman coefficient of RAPID-3 with DAS-28 was 0.637 and of RAPID-3 with CDAI was 0.713. A study by Seong Kyu-Kim et al[67] suggested correlation coefficient of 0.62 and 0.75 (both p value< 0.0001) of RAPID-3 with DAS-28 and CDAI respectively. The weighted kappa value reported here was 0.33 for agreement of RAPID-3 with DAS-28 and CDAI, both. There kappa statistic was also in the range of kappa value of our study. Similarly a Colombian study of 119 patients by Munoz JGB et al[58] to study correlation of RAPID-3 with other indices yielded results equivalent

to our study. A strong correlation was quoted between RAPID-3 and DAS 28 (spearman coefficient value= 0.719 at $p < 0.001$) and between RAPID-3 and CDAI (spearman correlation coefficient value =0.752 at $p < 0.001$). They concluded RAPID-3 to be an useful tool in view of its ease of use, no requirement of lab tests and no requirement for joint count.

Thus, the results of our present study indicate that Punjabi version of RADAI-5 is a feasible, reliable and valid questionnaire which holds validity on various fronts. It can be is easily administered in RA patients, especially in Indian Punjabi population, to assess their disease activity. Punjabi version of RADAI-5 and RAPID-3 have a strong significant correlation with both DAS-28 and CDAI. Punjabi version of RADAI-5 has fair agreement level with both DAS-28 and CDAI. RAPID-3 has moderate level of agreement with DAS-28 and slight but significant level of agreement with CDAI.

Punjabi version of RADAI-5 and RAPID-3 have significant correlation and concordance with DAS28 and CDAI. Thus RADAI-5 and RAPID-3 can yield same information about disease severity as by DAS-28 and CDAI and can replace them, especially in a busy OPD setting.

SUMMARY AND CONCLUSIONS

1. RADAI-5 was translated to Punjabi language using the standard guidelines. Punjabi version of RADAI-5 was then evaluated in terms of its validity and other psychometric properties for initial 2 months, during which total 45 RA patients were enrolled.
2. Punjabi version of RADAI-5 has reliability as it has satisfactory level of internal consistency with Cronbach's alpha value of 0.745.
3. Punjabi version of RADAI-5 was also found to be feasible with no floor or ceiling effect.
4. Punjabi version of RADAI-5 was found to be valid in nature having a significant criterion correlation with both DAS-28 and CDAI with spearman coefficient value of 0.835 and 0.797 (p value < 0.0001), hence fulfilling the criterion validity. Construct validity ,content validity and face validity were proved.
5. The Punjabi version of RADAI-5 has the properties of feasibility, reliability and validity.
6. Punjabi version of RADAI-5, RAPID-3, DAS-28 and CDAI were used in 200 RA patients visiting the OPD to assess the disease severity of RA patients.
7. Out of 200 patients, 85.5% (171 patients) were female and 14.5% (21 patients) were male. The mean age was 47.65 ± 12.15 years. Mean ESR value is 43.17 ± 22.25 mm/hour. Patients had varying education level.
8. 86 % (172 patients) were seropositive. In total 36.5% (73 patients) had deformities.14.5% (29 patients) had positive family history of RA, mostly in the first degree relative. 59.5% (119 patients)had disease duration of 2 to <10 years.
9. Hypertension was the most common coexisting co-morbidity (in 16.5%), followed by hypothyroidism (in 11.5% patients). The most common extra-articular manifestation was secondary Sjogren syndrome which had frequency of 58.5% (117 patients), followed

by rheumatoid nodules in 29.5% (59 patients). About two third of patients (66 %) had anemia.

10. The mean DAS-28, CDAI, RADAI-5 and RAPID-3 scores were 4.38 ± 1.23, 13.79 ± 7.81, 4.3 ± 1.74 and 12.17 ± 5.71 respectively.
11. RADAI-5 (Punjabi version) has very strong and significant correlation with DAS-28 and CDAI with spearman coefficient of RADAI-5 with DAS-28 and CDAI being 0.868 and 0.869 respectively, both having p value <0.0001.
12. RADAI-5 has fair level of agreement with both DAS-28 and CDAI with the kappa agreement statistic value of 0.391 (p value=0.0001) and 0.391 (p value=0.006) respectively.
13. RAPID-3 has very strong and significant correlation with DAS-28 and CDAI with spearman coefficient of RAPID-3 with DAS-28 and CDAI being 0.862 and 0.906 respectively, both having p value of <0.0001
14. RAPID-3 had moderate level of agreement with DAS-28 at a kappa value of 0.468 (p value < 0.0001). RAPID-3 has slight but statistically significant level of agreement with CDAI at kappa value of 0.157 (p value < 0.0001)
15. Punjabi version of RADAI-5 and RAPID3 have significant strong correlation with DAS-28 and CDAI. The different disease severity categories as per RADAI-5 and RAPID-3 are in agreement to those by DAS-28 and CDAI. Thus there is concordance of RADAI-5 and RAPID-3 with both DAS-28 and CDAI. Since, Punjabi version of RADAI-5 and RAPID-3 yield almost similar information about disease severity as that by DAS-28 and CDAI, therefore RADAI-5 and RAPID-3 can be used to assess disease severity without the need of formal joint count by physician and ESR value and thus seems to be a quicker, effective and easier way to assess disease activity in a busy OPD especially in resource limited settings.

BIBLIOGRAPHY

1. Rho YH, Chung CP, Oeser A, Solus J, Asanuma Y, Sokka T,et al. Inflammatory mediators and premature coronary atherosclerosis in rheumatoid arthritis. Arthritis Rheum.2009;61:1580-85.
2. Meyer PW, Anderson R, Ker JA, Ally MT. Rheumatoid arthritis and risk of cardiovascular disease. Cardiovasc J Afr. 2018;29:317-321.
3. Lee dm, Weinblatt ME. Rheumatoid arthritis. Lancet. 2001;358,903-11
4. Osipova D, Janssen R, Martens HA. Reumatoide arthritis: meer dan een gewrichtsziekte [Rheumatoid arthritis: more than a joint disease]. Ned Tijdschr Geneeskd. 2020;164:D4166
5. Van der Woude D, van der Helm-van Mil AHM. Update on the epidemiology, risk factors, and disease outcomes of rheumatoid arthritis. Best Pract Res Clin Rheumatol. 2018;32:174-87.
6. Malaviya AN, Kapoor SK, Singh RR, Kumar A, Pande I.Prevalence of rheumatoid arthritis in the adult Indian population. Rheumatol Int.1993;13:131-34.
7. Avina-Zubieta JA, Choi HK, Sadatsafavi M, Etminan M, Esdaile JM, Lacaille D. Risk of cardiovascular mortality in patients with rheumatoid arthritis: a meta-analysis of observational studies. Arthritis Rheum. 2008;59:1690– 97.
8. Gonzalez A, Maradit Kremers H, Crowson CS. The widening mortality gap between rheumatoid arthritis patients and the general population. Arthritis Rheum. 2007;56:3583– 87.
9. Carmona L, Cross M, Williams B, Lassere M, March L. Rheumatoid arthritis. Best Pract Res Clin Rheumatol. 2010;24:733– 45.
10. Kvien TK, Uhlig T, Ødegård S, Heiberg MS. Epidemiological aspects of rheumatoid arthritis: the sex ratio. Ann N Y Acad Sci. 2006;1069:212-22.

11. Croia C, Bursi R, Sutera D, Petrelli F, Alunno A, Puxeddu I. One year in review 2019: pathogenesis of rheumatoid arthritis. Clin Exp Rheumatol. 2019;37:347-357. Epub 2019.
12. Reem H.A. Mohammed (November 19th 2020). Introductory Chapter: Rheumatoid Arthritis - Overview of Current Facts and Strategies, Rheumatoid Arthritis - Other Perspectives towards a Better Practice, Reem Hamdy A. Mohammed, IntechOpen, Available from: https://www.intechopen.com/chapters/72458.
13. Citera G, Padulo LA, Fernandez G, Lazaro MA, Rosemffet MG, Maldonado Cocco JA. Influence of HLA-DR alleles on rheumatoid arthritis: susceptibility and severity in Argentine patients. J Rheumatol. 2001;28:1486-91.
14. Wakitani S, Murata N, Toda Y, Ogawa R, Kaneshige T, Nishimura Y et al. The relationship between HLA-DRB1 alleles and disease subsets of rheumatoid arthritis in Japanese. Br J Rheumatol. 1997;36:630-36.
15. Firestein GS, Zvaifler NJ. How important are T cells in chronic rheumatoid synovitis?: II. T cell-independent mechanisms from beginning to end. Arthritis Rheum.2002;46:298-308.
16. Firestein GS. Evolving concepts of rheumatoid arthritis. Nature. 2003;15;423:356-61.
17. Scherer HU, Häupl T, Burmester GR. The etiology of rheumatoid arthritis. J Autoimmun.2020;110:102400.
18. Grassi W, De Angelis R, Lamanna G, Cervini C. The clinical features of rheumatoid arthritis. Eur J Radiol. 1998;27:S18-24.
19. Harb A, Shawwa K, Alraiyes AH, Alraies MC. Severe rheumatoid arthritis hand deformity. BMJ Case Rep. 2013;2013:1-2
20. Baerwald C, Kneitz C, Bach M, Licht M. Extraartikuläre Manifestationen der rheumatoiden Arthritis [Extra-articular manifestations of rheumatoid arthritis]. Z Rheumatol. 2012;71,841-9.

21. Turesson C, O'Fallon WM, Crowson CS, Gabriel SE, Matteson EL. Extra-articular disease manifestations in rheumatoid arthritis: incidence trends and risk factors over 46 years. Ann Rheum Dis. 2003;62:722-7.
22. Myasoedova E, Crowson CS, Turesson C, Gabriel SE, Matteson EL. Incidence of extra-articular rheumatoid arthritis in Olmsted County, Minnesota, in 1995-2007 versus 1985-1994: a population – based study; J Rheumatol.20111:38:983-9.
23. Conforti A, Di Cola I, Pavlych V, Ruscitti P, Berardicurti O, Ursini F, et al. Beyond the joints, the extra-articular manifestations in rheumatoid arthritis. Autoimmun Rev. 2021;20:102735.
24. Seriolo B, Sulli A, Burroni A, Cutolo M. Artrite reumatoide ed aterosclerosi Rheumatoid arthritis and atherosclerosis].Reumatismo.2003;55:140-6.
25. Dai Y, Wang W, Yu Y, Hu S. Rheumatoid arthritis-associated interstitial lung disease: an overview of epidemiology, pathogenesis and management. Clin Rheumatol. 2021;40:1211-1220.
26. Wilson A, Yu HT, Goodnough LT, Nissenson AR. Prevalence and outcomes of anemia in rheumatoid arthritis: a systematic review of the literature. Am J Med. 2004;116:50S-57S.
27. Matcham F, Rayner L, Steer S, Hotopf M. The prevalence of depression in rheumatoid arthritis: a systematic review and meta-analysis. Rheumatology (Oxford). 2013;52:2136-48.
28. Giles JT, Bartlett SJ, Andersen RE, Fontaine KR, Bathon JM. Association of body composition with disability in rheumatoid arthritis: impact of appendicular fat and lean tissue mass. Arthritis Rheum. 2008;59:1407-15.
29. Das S, Padhan P.An overview of the extraarticular involvement in rheumatoid arthritis and its management.Journal of pharmacology and pharmacotherapeutics. 2017:81-86.

30. Aletaha D, Neogi T, Silman AJ, Funovits J, Felson DT, Bingham CO 3rd, et al. 2010 rheumatoid arthritis classification criteria: an American College of Rheumatology/European League Against Rheumatism collaborative initiative. Ann Rheum Dis. 2010;69:1580-88.
31. Radner H, Neogi T, Smolen JS, Aletaha D. Performance of the 2010 ACR/EULAR classification criteria for rheumatoid arthritis: a systematic literature review. Ann Rheum Dis. 2014;73:114-23.
32. Pfizer,study ID 0881A-102317, B1801118. Current Adoption of Composite Indices in Evaluating Rheumatoid Arthritis Patients: An Observational Study (New Indices); 2013.
33. Anderson J, Caplan L, Yazdany J, Robbins ML, Neogi T, Michaud K, et al. Rheumatoid arthritis disease activity measures: American College of Rheumatology recommendations for use in clinical practice. Arthritis Care Res (Hoboken). 2012;64:640-7.
34. Demoruelle MK, Deane KD. Treatment strategies in early rheumatoid arthritis and prevention of rheumatoid arthritis. Curr Rheumatol Rep. 2012;14:472-480.
35. Aletaha D, Alasti F, Smolen JS.Optimisation of a treat-to-target approach in rheumatoid arthritis: strategies for the 3-month time point Annals of the Rheumatic Diseases. 2016;75:1479-1485.
36. SmolenJS, Aletaha D, BijlsmaJW, Breedveld FC, Boumpas D, Burmester G, et al. Treating rheumatoid arthritis to target: recommendations of an international task force. Ann Rheum Dis. 2010;69:631-37.
37. Singh JA, Saag KG, Bridges SL Jr, Akl EA, Bannuru RR, Sullivan MC, et al 2015 American College of Rheumatology Guideline for the Treatment of Rheumatoid Arthritis. Arthritis Rheumatol. 2016;68:1-26.
38. Cardiel MH. Treat to target strategy in rheumatoid arthritis: real benefits. Reumatol Clin. 2013;9:101-5.

39. Dougados M, Aletaha D, van Riel P. Disease activity measures for rheumatoid arthritis. Clin Exp Rheumatol. 2007;25,S22-9.
40. van der Heijde DM, van ‘t Hof MA, van Riel PL, Theunisse LA, Lubberts EW, van Leeuwen MA, et al. Judging disease activity in clinical practice in rheumatoid arthritis: first step in the development of a disease activity score. Ann Rheum Dis. 1990;49:916–20..
41. Fransen J, Welsing PMJ, de Keijzer RHM, van Riel PCLM. Development and validation of DAS28 using CRP. Ann Rheum Dis. 2003;62:SP0029.
42. Anderson JK, Zimmerman L, Caplan L, Michaud K. Measures of rheumatoid arthritis disease activity: Patient (PtGA) and Provider (PrGA) Global Assessment of Disease Activity, Disease Activity Score (DAS) and Disease Activity Score with 28-Joint Counts (DAS28), Simplified Disease Activity Index (SDAI), Clinical Disease Activity Index (CDAI), Patient Activity Score (PAS) and Patient Activity Score-II (PASII), Routine Assessment of Patient Index Data (RAPID), Rheumatoid Arthritis Disease Activity Index (RADAI) and Rheumatoid Arthritis Disease Activity Index-5 (RADAI-5), Chronic Arthritis Systemic Index (CASI), Patient-Based Disease Activity Score With ESR (PDAS1) and Patient-Based Disease Activity Score without ESR (PDAS2), and Mean Overall Index for Rheumatoid Arthritis (MOI-RA). Arthritis Care Res (Hoboken). 2011;63:S14-36.
43. Van Gestel AM, Prevoo MLL, van 't Hof MA, van Rijswijk MH, van de Putte LBA, van Riel PLCM. Development and validation of the European League Against Rheumatism response criteria for rheumatoid arthritis. Arthritis Rheum 1996;39:34–40.
44. Fransen J, Hauselmann H, Michel BA, Caravatti M, Stucki G. Responsiveness of the self-assessed Rheumatoid Arthritis Disease Activity Index to a flare of disease activity. Arthritis Rheum 2001;44:53–60.

45. Aletaha D, Smolen J. The Simplified Disease Activity Index (SDAI) and the Clinical Disease Activity Index (CDAI): a review of their usefulness and validity in rheumatoid arthritis. Clin Exp Rheumatol 2005;23:S100–8.
46. Singh H, Kumar H, Handa R, Talapatra P, Ray S, Gupta V. Use of clinical disease activity index score for assessment of disease activity in rheumatoid arthritis patients: an Indian experience. Arthritis. 2011;2011:146398.
47. Rintelen B, Haindl PM, Sautner J, Leeb BA, Deutsch C, Leeb BF. The rheumatoid arthritis disease activity index-5 in daily use. Proposal for disease activity categories. J Rheumatol. 2009;36:918-24.
48. Leeb BF, Haindl PM, Maktari A, Nothnagl T, Rintelen B. Patient centered rheumatoid arthritis disease activity assessment by a modified RADAI. J Rheumatol. 2008;35:1294–9.
49. Kamel SR. Using Rheumatoid Arthritis Disease Activity Index-5 questionnaire in the assessment of disease activity in patients with rheumatoid arthritis: correlation with quality of life, pain, and functional status. Egyptian Rheumatology and Rehabilitation.2018;45:43-8.
50. Singh H, Tanwar VS, Sukhija G, Mathur R, Kaur P. Rheumatoid arthritis disease activity index-5: Utility in busy clinical settings. Indian J Rheumatol 2017;12:72-5.
51. Leeb BF, Haindl PM, Maktari A, Nothnagl T, Rintelen B. DAS28 values differ considerably depending on patient's pain perception and gender. J Rheumatol. 2007;34:2382-87.
52. Tanwar VS, Singh H,Saini A, Sukhija G,Arora S, Kalra A. Rheumatoid Arthritis Disease Activity Index-5: An easy and effective way of monitoring patients with rheumatoid arthritis. Egyptian heumatology & Rehabilitation. 2019,46:269–77.

53. Bossert M, Prati C, Vidal C, Bongain S, Toussirot E, Wendling D. Evaluation of self-report questionnaires for assessing rheumatoid arthritis activity: A cross-sectional study of RAPID3 and RADAI5 and flare detection in 200 patients. Joint Bone Spine. 2012;79:57-62.
54. Sunar I, Yilmaz Tasdelen O, Garip Cimen Y, Bodur H. Translation and validation of the Turkish language version of the Rheumatoid Arthritis Disease Activity Index-5. Int J Rheum Dis. 2017;20:2012-19.
55. Pincus T, Yazici Y, Bergman MJ. RAPID3, an index to assess and monitor patients with rheumatoid arthritis, without formal joint counts: similar results to DAS28 and CDAI in clinical trials and clinical care. Rheum Dis Clin North Am. 2009;35:773-8.
56. PincusT, Swearingen CJ, Bergman M, Yazici Y. GRAPID3 (Routine Assessment of Patient Index Data 3), a Rheumatoid Arthritis Index Without Formal Joint Counts for Routine Care: Proposed Severity Categories Compared to Disease Activity Score and Clinical Disease Activity Index Categories. The journal of Rheumatology. 2008;35:2136-47.
57. Pincus T, Yazici Y, Bergman MJ. Patient questionnaires in rheumatoid arthritis: advantages and limitations as a quantitative, standardized scientific medical history. Rheum Dis Clin North Am. 2009;35:735-43.
58. Muñoz JGB, Giraldo RB, Santos AM, Bello-Gualteros JM, Rueda JC, et al. Correlation between rapid-3, DAS28, CDAI and SDAI as a measure of disease activity in a cohort of Colombian patients with rheumatoid arthritis. Clin Rheumatol. 2017;36:1143-8.
59. Kumar B.S. , Suneetha P , Mohan A , Kumar P , Sarma K.V.S : Comparison of Disease Activity Score in 28 joints with ESR (DAS28), Clinical Disease Activity Index (CDAI) , Health Assessment Questionnaire Disability Index (HAQ-DI) & Routine

Assessment of Patient Index Data with 3 measures (RAPID3) for assessing disease activity in patients with rheumatoid arthritis at initial presentation. Indian Med Res (Supplement); 2017.p 57-62.

60. Das AK, Sarkar RN, Das CK, Baisya R, Bhattacharjee U, Biswas P et al. A comparison of 3 rheumatoid arthritis disease activity indices in routine clinical practice. Indian J Rheumatol. 2017;12:209-13
61. Boone NW, Sepriano A, van der Kuy P.Routine Assessment of Patient Index Data 3 (RAPID3) alone is insufficient to monitor disease activity in rheumatoid arthritis in clinical practice RMD Open. 2019;5:e001050.
62. Zurita MF, Iglesias A, Vanegas E, Luzuriaga A, Zurita L. Measurement of Disease Activity in Ecuadorian Patients with Rheumatoid Arthritis: Does RAPID3 Correlate with Traditional Indexes?. The Scientific World Journal. 2019;2019:1-18.
63. Singh H, Gupta V, Ray S. Evaluation of disease activity in rheumatoid arthritis by Routine Assessment of Patient Index Data 3 (RAPID3) and its correlation to Disease Activity Score 28 (DAS28) and Clinical Disease Activity Index (CDAI): an Indian experience. Clin Rheumatol. 2012;31:1663–9.
64. Strand V, Lee EB, Yazici Y. Evaluation of disease activity in patients with rheumatoid arthritis treated with tofacitinib by RAPID3: post hoc analyses from two phase 3 trials. Clin Rheumatol. 2018;37:2043–53.
65. Pincus T, Swearingen CJ, Bergman MJ, Colglazier CL, Kaell AT, Kunath AM, et al. RAPID3 (Routine Assessment of Patient Index Data) on an MDHAQ (Multidimensional Health Assessment Questionnaire): Agreement with DAS28 (Disease Activity Score) and CDAI (Clinical Disease Activity Index) activity categories, scored in five versus more than ninety seconds. Arthritis Care Res. 2010;62:181-9.

66. Leeb BF, Sautner J, Mai HT, Haindl PM, Deutsch C, Rintelen B. A comparison of patient questionnaires and composite indexes in routine care of rheumatoid arthritis patients. Joint Bone Spine. 2009;76:658-64.
67. Kim SK, Park SH, Bae J, Son JT, Choe JY. Performance of Routine Assessment of Patient Index Data 3 (RAPID3) for assessment of rheumatoid arthritis in clinical practice: differential agreement of RAPID3 according to disease activity categories. Rheumatology International. 2014,34:1311-18.
68. Orbai AM, Bingham CO. Patient reported outcomes in rheumatoid arthritis clinical trials. Curr Rheumatol Rep. 2015;17:28.
69. Boers M, Kirwan JR, Wells G, Beaton D, Gossec L, d'Agostino MA et al. Developing core outcome measurement sets for clinical trials: OMERACT filter 2.0. J Clin Epidemiol. 2014;67:745-53.
70. Tugwell PS, Petersson IF, Boers M, Gossec L, Kirwan JR, Rader T et al. Domains selection for patient-reported outcomes: current activities and options for future methods. J Rheumatol. 2011;38:1702-10.
71. Frank L, Forsythe L, Ellis L, Schrandt S, Sheridan S, Gerson J, et al. Conceptual and practical foundations of patient engagement in research at the patient-centered outcomes research institute. Qual Life Res. 2015;24:1033-41.
72. Frank L, Basch E, Selby JV. The PCORI perspective on patient-centered outcomes research. JAMA. 2014;312:1513-4.
73. Hendrikx J, de Jonge MJ, Fransen J, et al. Systematic review of patientreported outcome measures (PROMs) for assessing disease activity in rheumatoid arthritis. RMD Open 2016;2:e000202.
74. Seppen BF, L'ami MJ, Duarte dos Santos Rico S, ter Wee MM, Turkstra F, Roorda LD, et al. WHA Smartphone App for Self-Monitoring of Rheumatoid Arthritis Disease Activity to Assist

Patient-Initiated Care: Protocol for a Randomized Controlled Trial J MIR Res Protoc. 2020;9:e15105.

75. Hulley SB, Cummings SR, Browner WS, Grady D, Newman TB. Designing clinical research: an epidemiologic approach. 4th ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2013.
76. Prion S, Haerling KA. Making sense of methods and measurement: Spearman-Rho Ranked-Order Correlation Coefficient.2014: Clinical Simulation in Nursing. 2014:535-36.
77. Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process of cross-cultural adaptation of self-report measures. Spine. 2000;25:3186–91.
78. Wild D, Grove A, Martin M, Eremenco S, McElroy S, Verjee-Lorenz A, Erikson P; ISPOR Task Force for Translation and Cultural Adaptation. Principles of Good Practice for the Translation and Cultural Adaptation Process for Patient-Reported Outcomes (PRO) Measures: report of the ISPOR Task Force for Translation and Cultural Adaptation. Value Health. 2005;8:94-104.
79. Katchamart W, Ussavasodhi P, Chiowchanwesawakit P, Chanapai W. Cross-cultural adaptation and validation of the Thai version of the Rheumatoid Arthritis Disease Activity Index (RADAI). Rheumatol Int. 2013;33:2503-8.
80. Daud KAM, Khidzir NZ, Ismail AR, Abdullah FA. Validity and reliability of instrument to measure social media skills among small and medium entrepreneurs at Pengkalan Datu River. International Journal of Development and Sustainability. 2018;7:1026-37
81. Landis, J. Richard, and Gary G. Koch. “The Measurement of Observer Agreement for Categorical Data.Biometrics.1977;33:159–74.
82. McHorney CA, Tarlov AR. Individual-patient monitoring in clinical practice: are available health status surveys adequate?. Qual Life Res. 1995;4:293–307

83. Hecker KG,Violate C. Validity, Reliability, and Defensibility of Assessments in Veterinary Education.Journal of Veterinary Medical Education. 2009;36:271-5.
84. Khaliq T, Khan A, Malik IA. Clinical profile and treatment outcomes of patients with rheumatoid arthritis at a tertiary care hospital of Pakistan. J Pak Med Assoc. 2020 ;70:1143-9.
85. Aletaha D, Ward MM. Duration of rheumatoid arthritis influences the degree of functional improvement in clinical trials. Ann Rheum Dis. 2006;65:227-33.
86. Salma K, Nessrine A, Krystel E, Khaoula EK, Noura N, Khadija E, Taoufik H. Rheumatoid Arthritis: Seropositivity versus Seronegativity; A Comparative Cross-sectional Study Arising from Moroccan Context. Curr Rheumatol Rev. 2020;16:143-8.
87. AVS Anil Kumar, Kapil Gupta, Kartik S, Shruti A Kumar. Clinical profile of rheumatoid arthritis patients reporting to a tertiary care center – data from Southwestern part of India. International Journal of Contemporary Medical Research 2019;6:F26-32.
88. Murata K, Hashimoto M, Yamamoto W, Son Y, Amuro H, Nagai K et al. The family history of rheumatoid arthritis in anti-cyclic citrullinated peptide antibody-positive patient is not a predictor of poor clinical presentation and treatment response with modern classification criteria and treatment strategy: the ANSWER cohort study. Rheumatol Int. 2020;40:217-25.
89. Al-Bishri J, Attar S, Bassuni N, Al-Nofaiey Y, Qutbuddeen H, Al-Harthi S et al. Comorbidity profile among patients with rheumatoid arthritis and the impact on prescriptions trend. Clin Med Insights Arthritis Musculoskelet Disord. 2013 4;6:11-8.
90. Innala L, Sjöberg C, Möller B, Ljung L, Smedby T, Södergren A, Magnusson S, Rantapää-Dahlqvist S, Wållberg-Jonsson S. Co-morbidity in patients with early rheumatoid arthritis - inflammation matters. Arthritis Res Ther. 2016;18:33.

91. Kroot EJ, van Gestel AM, Swinkels HL, Albers MM, van de Putte LB, van Riel PL. Chronic comorbidity in patients with early rheumatoid arthritis: a descriptive study. J Rheumatol. 2001;28:1511-7.
92. Cojocaru M, Cojocaru IM, Silosi I, Vrabie CD, Tanasescu R. Extra-articular Manifestations in Rheumatoid Arthritis. Maedica (Bucur). 2010;5:286-91.
93. Goyal L, Shah PJ, Yadav RN, Saigal R, Agarwal A, Banerjee S. Anaemia in Newly Diagnosed Patients of Rheumatoid Arthritis and its Correlation with Disease Activity. J Assoc Physicians India. 2018;66:26-9.
94. Agrawal S, Misra R, Aggarwal A. Anemia in rheumatoid arthritis: high prevalence of iron-deficiency anemia in Indian patients. Rheumatol Int. 2006;26:1091-5.
95. Diggikar PM, Gokhale VS, Satoathy PK, Bakdania DD,Babu TV, Jai KD. A Study on Clinical Profile of Patients Presenting with Rhuematoid rthritis in a Tertiary Care Hospital of Pune City;Nati J Med Res. 2016;6:146-50.
96. Lindsay K, Ibrahim G, Sokoll K, Tripathi M, Melsom RD, Helliwell PS.The composite DAS score is impractical to use in daily practice: evidence that physicians use the objective component of the DAS in decision making. J Clin Rheumatol. 2009;15:223–5.
97. Haneline M, Cooperstein R. Weighing the reliability and Validity of clinical tests. Journal of the American chiropractic association;2008.

KEY TO MASTER CHART

Y	:	Yes
N	:	No
P	:	Positive
-	:	Could not be assessed
NA	:	Not available
M	:	Male
F	:	Female
HTN	:	Hypertension
DM	:	Diabetes Mellitus
HCV	:	Hepatitis c virus

In first visit/ follow up column 1: First visit to OPD

2: Follow up visit to OPD

ANA (IF)	:	Anti nuclear antibody (immunofluorescence)
TSH	:	Thyroid stimulating hormone
HbA1c	:	Glycosylated hemoglobin
USG	:	Ultrasound
UPCR	:	Urine Protein Creatinine Ratio
SPE	:	Serum protein electrophoresis
R/E	:	Routine
WNL	:	Within normal limit
ECHO	:	Echocardiography

S.No.	MRD No	Name Initial	Age (years)	Gender	Date of inclusion	Duration of disease (years)	Education	Smoker	Other co-morbidity	Any other autoimmune disease	History of RA in family	If family history present which member	Erosions	RF	Value of RA Factor if available (IU/ml)	Anti CCP	Value of ANTICCP if available (IU/ml)	Nodules	ILD	SS	Neuropathy	Vasculitis	Skin	ANY OTHER EXTRA ARTUCULAR MANIFESTATION	First visit/follow up	BP (mm of Hg)	HEIGHT (inches)	WEIGHT (kg)	BMI (kg/m^2)	HR (bpm)
1	783143	VPK	50	F	18/2/20	5	5	N	Y POST LEFT TKR	N	N	N	-	P	241.15	NA	NA	N	N	N	N	N	N	N	2	120/80	64	74	28.00	60
2	780734	LK	35	F	18/2/20	3	B.A.	N	N	Y HYPOTHYROID	N	N	-	P	NA	NA	NA	N	N	N	N	N	N	N	2	130/80	65	74	27.15	84
3	900986	RK	37	F	18/2/20	0.33	UNEDUCATED	N	N	N	N	N	-	P	NA	NA	NA	N	N	Y	N	N	N	N	2	130/80	60	43	18.51	84
4	785731	KK	60	F	18/2/20	4	UNEDUCATED	N	N	N	N	N	-	P	105.2	NA	NA	N	N	Y	Y	N	N	N	2	130/70	60	45	19.38	90
5	584828	BK	46	F	18/2/20	1	8	N	Y HTN	N	N	N	-	P	NA	NA	NA	Y	N	Y	Y	N	N	N	2	140/80	64	68	25.73	72
6	885455	BK	50	F	18/2/20	1	5	N	Y HTN	N	N	N	-	P	NA	P	>500	N	N	Y	Y	N	N	N	2	120/70	64	74	28.00	74
7	843316	NK	34	F	18/2/20	8	10	N	N	N	N	N	-	P	61	NA	NA	Y	N	Y	N	N	N	N	2	120/70	58	38	17.51	58
8	783542	MS	55	M	18/2/20	4	GRADUATE	N	N	N	N	N	Y	N	NA	N	NA	N	N	Y	N	N	N	N	2	130/80	66	83	29.53	88
9	821417	DS	58	M	20/2/20	8	12	N	N	N	N	N	-	P	280	P	>200	N	N	N	N	N	N	N	2	110/70	69	80	26.05	82
10	902541	KD	61	F	20/2/20	12	12	N	Y DM, HTN	N	Y	MOTHER	-	P	NA	NA	NA	N	N	N	N	N	N	N	2	130/70	65	43	15.78	65
11	35957	GK	50	F	21/2/20	5	UNEDUCATED	N	Y DM, HTN	N	N	N	-	P	NA	NA	NA	N	N	Y	N	N	N	N	2	140/70	61	50	20.83	79
12	429714	NW	69	F	21/2/20	1	10	N	Y HTN	N	N	N	-	P	NA	NA	NA	N	N	N	Y	N	N	N	2	140/70	63	50	19.53	84
13	214018	MD	53	F	24/2/20	2	UNEDUCATED	Y	Y HTN	N	N	N	-	N	2.2	P	>550	N	N	Y	N	N	N	N	2	160/90	66	69	24.55	98
14	365205	JK	67	F	25/2/20	5	4	N	N	N	N	N	-	P	88	NA	NA	Y	N	Y	N	N	N	N	2	140/70	66	60	21.35	89
15	20478	KK	53	F	25/2/20	0.16	10	N	Y DM	Y HYPOTHYROID	N	N	-	P	105.5	NA	NA	N	N	N	N	N	N	GLAUCOMA	2	130/70	55	44	22.55	61
16	648404	RS	34	F	25/2/20	1.5	12	N	N	Y HYPOTHYROID	N	N	-	P	115	P	1408.3	N	N	N	N	N	N	N	2	120/80	65	72	26.41	96
17	882023	BK	69	F	27/2/20	9	5	N	Y HTN	N	N	N	-	P	32.7	NA	NA	Y	Y	Y	N	N	N	N	2	140/80	64	65	24.60	72
18	907002	PK	36	M	27/2/20	5	8	N	N	N	N	N	-	P	136	NA	NA	N	N	Y	N	N	N	N	1	140/80	70	85	26.89	102
19	878493	AG	52	F	03-03-2020	8	12	N	N	N	N	N	-	N	NA	N	NA	N	N	N	N	N	N	N	2	110/70	63	67	26.17	69
20	734187	SK	35	F	03-05-2020	3	MSC	N	N	N	Y	MOTHER	-	P	133	NA	NA	N	N	N	N	N	N	N	2	100/80	61	59	24.58	78
21	858530	N	30	F	03-07-2020	4	10	N	N	N	Y	MOTHER	-	P	162	NA	NA	N	N	Y	N	N	N	N	2	120/70	55	48	24.60	61
22	742021	GK	46	F	03-07-2020	4	8	N	Y SEVERE OA KNEE	N	N	N	-	P	NA	NA	NA	N	N	Y	N	N	N	N	2	90/60	54	52	27.64	70
23	623962	SR	60	F	03-12-2020	30	7	N	Y SEVERE OA KNEE	N	N	N	-	P	NA	NA	NA	N	N	N	N	N	N	LEFT LUMBOSACRAL RADICULOPATHY	2	110/80	61	107	44.57	64
24	82828	RS	48	M	13/3/20	10	UNEDUCATED	N	Y DM	N	N	N	-	P	NA	NA	NA	N	N	N	N	N	N	N	2	130/70	63	67	26.17	65
25	38460	SK	48	F	13/3/20	3	10	N	N	N	N	N	-	P	38	NA	NA	N	N	Y	N	N	N	N	2	120/80	67	67	23.13	72
26	584040	SM	49	F	13/3/20	7	10	N	Y HTN	Y HYPOTHYROID	N	N	-	P	NA	P	110	N	N	Y	N	N	N	N	2	140/96	64	82.5	31.22	91
27	223957	MI	45	M	14/3/20	10	10	N	N	N	N	N	-	P	NA	NA	NA	Y	N	Y	Y	N	N	N	2	130/80	63	62	24.21	80

S.No.	MRD No	PALLOR	DEFORMITY	ICTERUS/CYANOSIS/EDEMA/CLUBBING	Hb (gm/dl)	TLC (10^3/ul)	PLT COUNT (10^3/ul)	AST (U/l)	ALT (U/l)	CREATININE (mg/dl)	ESR (mm/hour)	CRP (mg/L) (OPTIONAL)	FULFILLING EULAR CRITERIA	RADAI 5 Q1	RADAI5 Q2	RADAI5 Q3	RADAI5 Q4	RADAI5 Q5	FN(0-10)	PAIN (0-10)	PGA (0-10cm) or ptge	PGA (0-100 mm)	EGA (0-10 cm)	EGA (0-100 mm)	EMS (min)	TJC	SJC	DAS 28	CDAI	RADAI 5	RAPID 3	Any other investigation	Any identified cause of flare
1	783143	N	Y	N/N/N/N	12.3	8.2	351	16	18	0.6	55	26.77	Y	5	8	8	4	0	2.3	5.5	3	30	1	10	0	4	2	4.74	10	5	10.8	URIC ACID =4.7	N
2	780734	N	Y	N/N/N/N	11.7	7.8	168	29	36	0.8	50	NA	Y	6	8	7	6	1	6.3	7.5	7	70	5	50	15	5	7	5.71	24	5.6	20.8	HBsAg -NR, ANTI HCV-NR	N
3	900986	Y	Y	N/N/N/N	10.8	10.3	437	12	13	0.69	30	3.63	Y	8	8	7	5	2	1.7	8	6	60	3	50	120	3	2	4.59	14	6	15.7	N	N
4	785731	Y	Y	N/N/N/N	11	7.3	225	10	15	0.75	45	NA	Y	7	6	7	6	2	3.7	5.5	6	60	4	40	120	5	1	5.04	16	5.6	15.2	N	WINTERS
5	584828	N	Y	N/N/N/N	12.1	7.9	273	80	53	0.8	25	NA	Y	8	5	5	4	0	1	7	3	30	1.5	15	0	1	0	3.23	5.5	4.4	11	URINE R/E-WNL	N
6	885455	Y	N	N/N/N/N	11	5	242	60	64	0.72	64	NA	Y	8	7	6	8	2	7.3	8	8	80	5	50	60	3	6	5.69	22	6.2	23.3	TSH = 2.6, ANA IF= 2+(NUCLEAR HOMOGENOUS)	N
7	843316	Y	N	N/N/N/N	9.4	8.9	334	17	27	0.54	23	NA	Y	7	7	6	4	1	1	5	3	30	2	20	30	3	2	3.98	10	5	9	N	N
8	783542	N	Y	N/N/N/N	14.4	5.8	184	50	37	0.7	16	10	Y	5	6	5	2	0	1	7	3	30	3	30	10	0	2	2.76	8	3.6	11	N	N
9	821417	N	Y	N/N/N/N	14.5	5.7	311	27	34	0.92	15	NA	Y	5	3	0	3	1	0.3	3	3	30	1	10	30	1	1	3.16	6	2.4	6.3	N	N
10	902541	Y	Y	N/N/N/N	11	7.75	283	8	15	0.4	64	NA	Y	8	6	6	6	2	2.7	8	6	60	6	60	60	6	4	5.68	22	5.6	16.7	TSH=2.19, HBA1c=9.1	MORINING
11	35957	Y	Y	N/N/N/N	11	7.4	219	32	40	0.9	16	NA	Y	1	1	0	0	0	1	1	1	10	0.5	5	5	0	0	2.08	1.5	0.4	3	N	N
12	429714	N	Y	N/N/N/N	11.4	4.9	167	27	23	NA	13	NA	Y	4	0	0	0	0	0.3	0	1	10	0	0	5	0	0	1.94	1	0.8	1.3	N	N
13	214018	N	N	N/N/N/N	13.5	13.1	217	20	26	NA	12	NA	Y	6	1	1	1	0	0.3	0.5	1	10	1	10	10	0	0	1.88	2	1.8	1.8	CALCIUM= 10.5, TSH=2.63, URIC ACID=4.3,HBA1c=6.2	N
14	365205	N	Y	N/N/N/N	10	10	213	12	19	0.6	25	NA	Y	8	7	6	5	1	1.7	6	8	80	3	30	30	1	3	4.42	15	5.4	15.7	N	N
15	20478	N	Y	N/N/N/N	11.2	7.9	275	24	29	0.51	13	NA	Y	2	0	0	2	0	0.3	2	3	30	0.5	5	0	0	0	2.22	3.5	0.8	5.3	HBA1c=6.4	N
16	648404	Y	N	N/N/N/N	9.7	9.2	221	24	30	0.75	35	NA	Y	8	8	7	7	1	3.3	8	7	70	7	70	30	4	4	5.15	22	6.2	18.3	N	N
17	882023	Y	Y	N/N/N/N	12.3	8.7	296	27	24	1.02	26	7.29	Y	5	1	1	4	2	3.3	5	5	50	3	30	45	0	1	3.26	9	2.6	13.3	ANA PROFILE-NEGATIVE	N
18	907002	N	Y	N/N/N/N	13.8	7.8	211	29	39	0.69	21	NA	Y	5	2	2	4	0	0.3	7	5	50	4	40	20	2	4	4.18	15	2.6	12.3	N	OVEREXERTION, WEATHER
19	878493	N	N	N/N/N/N	11.4	6	276	23	28	0.64	76	NA	Y	9	7	8	7	1	2.3	7.5	6.5	65	6	60	40	4	7	5.80	23.5	6.4	16.3	N	N
20	734187	N	N	N/N/N/N	12.2	6.1	238	19	20	0.7	21	NA	Y	4	3	2	3	0	1	5	4	40	2.5	25	0	0	2	3.09	8.5	2.4	10	N	DIET
21	858530	Y	N	N/N/N/N	10.1	7.9	163	47	62	1	10	NA	Y	4	0	0	2	0	0.7	5	3	30	2	20	0	0	1	2.31	6	1.2	8.7	N	POST DELIVERY
22	742021	Y	N	N/N/N/N	12.4	3.39	176	26	26	0.85	21	NA	Y	5	1	1	1	0	0.3	1	1	10	0	0	0	0	0	2.27	1	1.6	2.3	N	N
23	623962	Y	Y	N/N/N/N	10.9	6.86	189	27	23	0.45	60	NA	Y	8	9	10	9	1	6.3	10	9	90	7	70	30	3	3	5.58	22	7.4	25.3	N	FATIGUE OR OVEREXERTION
24	82828	N	Y	N/N/N/N	14.5	13.3	265	20	22	1.07	45	NA	Y	4	7	6	4	1	0.3	7	6.5	65	3	30	20	2	3	4.85	14.5	4.4	13.8	N	N
25	38460	Y	N	N/N/N/N	9.1	5.9	222	36	21	NA	21	NA	Y	2	0	0	1	0	0	0.5	1	10	0	0	0	0	0	2.27	1	0.6	1.5	ANA-NEGATIVE	N
26	584040	N	Y	N/N/N/N	10.8	6.2	332	24	26	0.78	30	NA	Y	6	4	4	4	0	1	4	4.5	45	2.5	25	20	2	0	3.80	9	3.6	9.5	N	N
27	223957	N	Y	N/N/N/N	14.3	6	230	25	29	0.66	34	NA	Y	9	7	7	4	1	1.3	4	5.5	55	2	20	30	1	2	4.19	10.5	5.6	10.8	N	FATIGUE OR OVEREXERTION

S.No.	MRD No	Name Initial	Age (years)	Gender	Date of inclusion	Duration of disease (years)	Education	Smoker	Other co-morbidity	Any other autoimmune disease	History of RA in family	If family history present which member	Erosions	RF	Value of RA Factor if available (IU/ml)	Anti CCP	Value of ANTICCP if available (IU/ml)	Nodules	ILD	SS	Neuropathy	Vasculitis	Skin	ANY OTHER EXTRA ARTUCULAR MANIFESTATION	First visit/follow up	BP (mm of Hg)	HEIGHT (inches)	WEIGHT (kg)	BMI (kg/m^2)	HR (bpm)
28	810080	HG	32	F	14/3/20	5	10	N	N	N	Y	MATERNAL AUNT	-	N	NA	N	NA	N	N	N	N	N	N	N	2	100/60	61	50	20.83	96
29	139101	MR	34	F	21/3/20	4	8	N	N	N	Y	MATERNAL UNCLE	-	P	NA	NA	NA	N	N	N	N	N	N	N	2	90/70	64	52	19.68	89
30	641337	JK	61	F	05-01-2020	13	UNEDUCATED	N	N	N	N	N	-	P	NA	NA	NA	Y	N	Y	Y	N	N	N	2	130/70	62	75	30.24	99
31	689146	SK	37	F	05-11-2020	6	6	N	N	N	N	N	-	NA	NA	P	NA	Y	N	N	N	N	N	N	1	120/80	64	70	26.49	88
32	150424	RK	57	F	05-11-2020	6	UNEDUCATED	N	N	N	N	N	-	P	NA	NA	NA	Y	N	N	N	N	N	N	2	130/80	63	82	32.02	90
33	928578	N	53	F	06-09-2020	15	8	N	Y SEVERE OA KNEE	N	N	N	-	P	NA	NA	NA	Y	N	N	N	N	N	N	2	130/90	65	100	36.69	97
34	931836	CK	60	F	06-09-2020	0.3	UNEDUCATED	N	Y HTN	N	N	N	-	P	14.4	N	<7	N	Y	N	N	N	N	N	2	140/90	66	80	28.47	70
35	915292	HK	55	F	16/6/20	6	UNEDUCATED	N	Y DM	N	N	N	Y	N	NA	N	NA	Y	N	Y	N	N	N	N	2	130/90	63	80	31.24	101
36	936366	PK	45	F	27/6/20	0.3	10	N	N	Y HYPOTHYROID	N	N	-	P	59.8	P	>500	N	N	N	Y	N	N	N	2	130/80	65	88	32.28	80
37	936251	HK	64	F	30/6/20	3	5	N	N	N	N	N	-	P	NA	NA	NA	Y	N	Y	Y	N	N	N	2	110/80	61	50	20.83	80
38	929656	RR	26	F	30/6/20	2	12	N	N	N	N	N	-	P	NA	NA	NA	N	N	N	N	N	N	N	2	110/70	64	60	22.71	84
39	663542	KK	29	F	30/6/20	1	10	N	N	N	N	N	-	P	NA	NA	NA	N	N	Y	N	N	N	N	2	110/80	63	50	19.53	90
40	926218	JK	37	F	30/6/20	5	12	N	N	N	N	N	-	P	182	N	N	N	N	N	Y	N	N	N	2	120/90	65	87	31.92	88
41	817005	JK	46	F	30/6/20	14	8	N	N	Y HYPOTHYROID AND IBS	N	N	-	N	NA	P	NA	Y	Y	N	Y	N	N	N	1	130/80	66	112	39.85	94
42	913434	GK	55	F	07-02-2020	2	8	N	N	N	N	N	-	P	NA	NA	NA	N	N	Y	Y	N	Y	N	2	126/84	NA	NA	#VALUE!	68
43	917736	DK	58	F	07-02-2020	2	5	N	N	N	N	N	Y	P	NA	P	144	N	N	N	N	N	N	N	2	140/100	65	79	28.98	87
44	48310	PK	34	F	07-09-2020	3	12	N	N	N	N	N	-	P	NA	NA	NA	N	N	Y	N	N	N	N	2	110/80	62	66	26.61	73
45	58097	GK	44	F	21/7/2020	1.5	11	N	Y HTN	N	N	N	-	P	NA	NA	NA	Y	N	N	Y	N	N	N	2	120/80	64	74	28.00	85
46	271025	KS	45	M	21/7/20	3	11	N	Y HTN	N	N	N	-	P	NA	NA	NA	Y	N	N	N	N	N	N	2	130/86	68	84	28.16	65
47	39077	RB	62	M	21/7/20	5	12	N	Y HTN	N	N	N	-	P	NA	P	NA	N	N	Y	N	N	N	N	1	140/80	66	76	27.04	69
48	61708	UR	45	F	28/7/2020	0.5	12	N	N	N	N	N	-	N	NA	P	310	N	N	N	N	N	N	N	1	110/70	65	60	22.01	80
49	29436	BK	49	F	28/7/20	8	UNEDUCATED	N	N	N	N	N	-	P	NA	NA	NA	Y	N	Y	N	N	N	N	2	126/80	64	88	33.30	77
50	863391	JS	41	M	28/7/20	4	GRADUATE	N	Y HTN	Y PSORIASIS	Y	MOTHER	-	N	NA	P	>200	Y	N	Y	N	N	Y	N	2	140/70	71	111	34.13	102
51	955619	IK	45	F	17/8/20	7	8	N	N	N	N	N	-	P	47.6	NA	NA	N	Y	N	N	N	N	N	2	120/70	66	81	28.82	97
52	966903	MS	50	M	18/9/20	20	UNEDUCATED	N	N	N	N	N	-	P	58.2	P	>500	Y	N	N	N	N	N	N	2	130/82	68	70	23.46	93
53	935095	IS	62	M	29/9/20	8	10	N	Y HTN	N	N	N	-	P	15.9	NA	NA	N	N	Y	Y	N	N	N	2	144/86	69	85	27.67	90
54	23019	MB	31	F	10-07-2020	0.16	POST GRADUATE	N	Y HTN	N	N	N	-	P	NA	N	NA	N	N	N	N	y	N	N	2	110/80	64	69	26.11	94
55	904779	A	55	F	13/10/20	9	5	N	N	N	N	N	-	P	NA	NA	NA	N	N	N	N	N	N	N	2	120/76	67	75	25.90	58
56	696118	GB	30	F	13/10/20	7	UNEDUCATED	N	N	N	N	N	-	P	NA	N	NA	N	N	N	N	N	N	N	2	130/70	63	80	31.24	88
57	695881	BR	64	F	13/10/20	2	UNEDUCATED	N	Y DM	N	N	N	-	P	NA	NA	NA	N	N	N	N	N	N	N	2	120/70	66	86	30.60	99
58	714958	SD	49	F	13/10/20	5	MATRIC	N	N	N	N	N	-	P	194	NA	NA	N	N	Y	N	N	N	N	2	110/80	66	80	28.47	78
59	783960	GS	27	M	13/10/20	2	12	N	N	Y VITILIGO	N	N	-	P	21	P	>500	N	N	N	N	N	N	N	2	120/90	69	85	27.67	71
60	681021	BKB	60	F	13/10/20	1	UNEDUCATED	N	Y DM	N	N	N	-	P	69	P	380	N	N	Y	N	N	N	N	1	124/84	65	77	28.25	100
61	131696	MK	38	F	15/10/20	10	8	N	N	N	N	N	-	P	21	P	>500	N	N	Y	N	N	N	N	2	120/70	64	60	22.71	62
62	967321	PS	20	M	15/10/20	2	STUDYING	N	N	N	N	N	-	N	11.9	N	<7	N	N	N	N	N	N	N	2	110/80	69	70	22.79	89
63	48482	O	64	F	20/10/20	2.5	5	N	N	N	N	N	-	P	NA	NA	NA	N	N	N	N	N	N	N	2	140/96	62	78	31.45	101
64	29928	MB	57	F	20/10/20	8	GRADUATE	N	Y HTN	Y HYPOTHYROID	N	N	-	N	NA	N	NA	N	N	Y	Y	N	N	N	2	130/70	66	80	28.47	60
65	933864	SR	32	F	20/10/20	0.83	12	N	N	N	N	N	-	P	NA	P	>500	N	N	Y	N	N	N	N	2	110/70	64	70	26.49	69
66	945687	KS	41	M	20/10/20	5	MATRIC	N	N	N	N	N	-	P	NA	NA	NA	N	N	Y	Y	N	N	N	2	130/82	67	86	29.69	75

S.No.	MRD No	PALLOR	DEFORMITY	ICTERUS/CYANOSIS/EDEMA/CLUBBING	Hb (gm/dl)	TLC (10^3/ul)	PLT COUNT (10^3/ul)	AST (U/l)	ALT (U/l)	CREATININE (mg/dl)	ESR (mm/hour)	CRP (mg/L) (OPTIONAL)	FULFILLING EULAR CRITERIA	RADAI 5 Q1	RADAI5 Q2	RADAI5 Q3	RADAI5 Q4	RADAI5 Q5	FN(0-10)	PAIN (0-10)	PGA (0-10cm) or ptge	PGA (0-100 mm)	EGA (0-10 cm)	EGA (0-100 mm)	EMS (min)	TJC	SJC	DAS 28	CDAI	RADAI 5	RAPID 3	Any other investigation	Any identified cause of flare
28	810080	N	Y	N/N/N/N	12	7.9	120	70	62	0.37	41	NA	Y	8	6	6	7	1	2.7	8	9	90	5	50	35	2	2	5.05	18	5.6	19.7	N	N
29	139101	N	Y	N/N/N/N	11.9	8.6	437	24	21	0.86	65	NA	Y	5	7	10	8	2	3.7	10	9	90	5	50	50	4	7	6.04	25	6.4	22.7	N	N
30	641337	Y	Y	N/N/N/N	9.3	6.3	207	15	18	0.94	22	NA	Y	8	6	6	6	2	2.3	6	7	70	3	30	40	0	2	3.54	12	5.6	15.3	N	N
31	689146	Y	N	N/N/N/N	9.8	5	222	20	18	0..67	66	NA	Y	7	8	6	8	1	1.3	7	8	80	5	50	50	4	6	5.86	23	6	16.3	N	N
32	150424	N	N	N/N/N/N	13.4	7.7	212	19	20	0.67	40	NA	Y	6	7	5	5	1	1.3	5	6	60	3	30	50	2	1	4.49	12	4.8	12.3	N	N
33	928578	Y	N	N/N/N/N	12.3	8.7	235	16	20	0.65	27	11.22	Y	5	2	1	4	1	4.3	3	5	50	2	20	60	1	3	4.05	11	2.6	12.3	N	WINTERS
34	931836	Y	Y	N/N/N/N	9.5	9.9	352	14	13	1.18	48	24	Y	8	2	2	4	1	2.7	3.5	3	30	5	50	30	1	2	4.09	11	3.4	9.2	N	N
35	915292	N	N	N/N/N/N	13.2	8.9	168	20	24	0.65	12	NA	Y	7	2	1	2	0	2	4	2	20	1	10	15	0	1	2.30	4	2.4	8	UPCR=0.2	N
36	936366	Y	N	N/N/N/N	10.2	7.4	244	53	18	0.76	46	230.85	Y	7	7	5	6	1	1.7	5	6	60	3	30	50	5	0	4.77	14	5.2	12.7	N	N
37	936251	N	N	N/N/N/N	11.5	8.5	197	24	24	0.66	67	25.55	Y	8	7	6	7	2	2.7	8	7	70	5	50	60	7	4	5.96	23	6	17.7	ANA(IF)=2+,AC-4 1:640	N
38	929656	N	N	N/N/N/N	11.2	5.6	288	24	22	0.7	36	NA	Y	7	5	4	5	1	1	4	4	40	3	30	30	3	0	4.04	10	4.4	9	N	N
39	663542	N	N	N/N/N/N	11.8	5.6	137	45	23	0.8	38	NA	Y	8	2	2	1	0	0.7	1.5	0.5	5	2	20	0	1	2	3.57	5.5	2.6	2.7	N	N
40	926218	N	N	N/N/N/N	11.1	7.6	240	33	32	0.86	70	NA	Y	9	5	7	8	0	1.7	6	8	80	7	70	25	8	3	6.16	26	5.8	15.7	N	N
41	817005	Y	N	N/N/N/N	10.6	10.5	414	55	52	NA	75	NA	Y	7	9	8	8	2	6.7	9.5	9	90	10	100	45	3	9	6.09	31	6.8	25.2	URINE R/E-WNL, URIC ACID=4.1	N
42	913434	N	Y	N/N/N/N	14.3	6.8	150	31	31	0.87	9	NA	Y	6	4	3	5	0	0.7	4.5	5	50	2	20	5	0	1	2.52	8	3.6	10.2	N	N
43	917736	N	Y	N/N/N/N	13.5	7.4	270	16	18	0.82	45	2.6	Y	5	8	7	6	1	1.7	7	6	60	5.5	55	60	5	3	5.24	19.5	5.4	14.7	N	N
44	48310	N	N	N/N/N/N	11.4	7.4	300	23	24	0.72	43	NA	Y	7	6	5	5	1	1	5	5	50	2	20	35	2	0	4.12	9	4.8	11	N	N
45	58097	N	Y	N/N/N/N	13.9	8.1	297	23	22	0.5	42	6.4	Y	5	2	3	4	1	1.7	3	2	20	2	20	5	1	2	3.85	7	3	6.7	CALCIUM=8.5	N
46	271025	N	N	N/N/N/N	10.8	6	224	26	24	0.71	42	NA	Y	8	4	6	4	1	1	5	3	30	3	30	60	1	3	4.08	10	4.6	9	N	N
47	39077	Y	N	N/N/N/N	11	6.8	345	20	18	0.81	57	NA	Y	7	5	4	4	0	0.7	4	4	40	3	30	30	2	1	4.46	10	4	8.7	N	N
48	61708	Y	N	N/N/N/N	11.4	7.4	395	14	10	0.44	55	NA	Y	6	7	8	7	2	1	7	6	60	4.5	45	110	5	4	5.46	19.5	6	14	N	N
49	29436	Y	Y	N/N/N/N	10.6	6.5	236	23	24	0.77	36	NA	Y	7	4	3	2	0	0.7	3	2.5	25	2	20	20	1	0	3.42	5.5	3.2	6.2	N	N
50	863391	N	N	N/N/N/N	13.9	9.6	202	25	32	0.97	57	45.4	Y	5	7	6	5	0	1.3	6	5	50	4	40	10	0	4	4.09	13	4.6	12.3	N	FATIGUE OR OVEREXERTION
51	955619	N	Y	N/N/N/N	12.3	7.5	318	23	28	0.8	49	17.59	Y	6	7	6	6	2	1.3	6	6.5	65	6	60	150	5	4	5.45	21.5	5.4	13.8	URIC ACID=5.5	N
52	966903	N	N	N/N/N/N	10.9	6.5	225	40	36	0.98	30	26.45	Y	6	7	5	4	0	1	4	5	50	4	40	20	4	3	4.69	16	4.4	10	URIC ACID= 5.2	N
53	935095	N	N	N/N/N/N	14.2	9.6	198	14	19	0.9	72	22.03	Y	7	8	9	7	2	2	8	7	70	6	60	120	6	5	5.97	24	6.6	17	N	N
54	23019	Y	N	N/N/N/N	10.7	6.6	389	28	31	0.81	45	NA	Y	7	4	3	3	0	0.3	3	3	30	2.5	25	20	0	0	3.08	5.5	3.4	6.3	ANA-NEGATIVE	N
55	904779	N	N	N/N/N/N	13.2	9.2	287	25	26	0.64	64	NA	Y	6	8	6	5	0	2	8.5	8	80	6	60	3	8	5	6.24	27	5	18.5	N	N
56	696118	Y	N	N/N/N/N	9.5	5.5	192	27	19	0.47	65	NA	Y	5	6	6	6	0	1.7	7.5	6	60	6	60	10	3	4	5.29	19	4.6	15.2	N	FATIGUE OR OVEREXERTION
57	695881	Y	Y	N/N/N/N	9.5	5.6	265	36	27	0.79	86	79.5	Y	7	9	9	9	1	5	9.5	9.5	95	8	80	60	7	8	6.72	32.5	7	24	N	N
58	714958	N	N	N/N/N/N	11.1	7.5	206	31	29	0.5	18	5.05 mg/l	Y	2	0	1	1	0	0.7	1.5	1.5	15	1.5	15	0	1	0	2.79	4	0.8	3.7	N	DIET- RICE
59	783960	N	N	N/N/N/N	13.2	6.6	242	19	18	0.51	34	14.92	Y	2	2	1	2	0	0	1	1	10	1	10	0	0	1	2.89	3	1.4	2	N	N
60	681021	N	Y	N/N/N/N	10.3	10.6	348	18	20	0.9	26	0.6	Y	6	0	1	1	0	0.7	1	1	10	1	10	20	1	1	3.26	4	1.6	2.7	N	N
61	131696	N	Y	N/N/N/N	10.7	7.3	150	22	36	0.41	30	9.7	Y	2	2	2	3	0	1.3	4	4.5	45	3	30	10	1	1	3.85	9.5	1.8	9.8	N	N
62	967321	Y	N	N/N/N/N	10.4	9	390	15	17	0.68	66	17.72 OF 27/10 AND 169.85 OF 24/9	Y	7	8	7	6	2	1.3	7	6	60	6	60	120	4	4	5.45	20	6	14.3	URIC ACID=1.9, VIT D3=13.28	N
63	48482	Y	N	N/N/N/N	10.3	8.5	199	32	30	0.66	68	NA	Y	8	6	6	5	1	1.7	6	4.5	45	4.5	45	30	4	3	5.19	16	5.2	12.2	N	N
64	29928	Y	Y	N/N/N/N	11.1	6.9	286	27	14	0.53	91	NA	Y	8	7	7	6	1	2	6	4	40	5	50	20	2	1	4.79	12	5.8	12	N	WINTERS
65	933864	N	N	N/N/N/N	10.3	7.7	100	37	46	0.7	36	NA	Y	7	5	5	4	0	0.7	2	1	10	1	10	0	0	1	2.93	3	4.2	3.7	ANA-NEGATIVE	N
66	945687	N	N	N/N/N/N	15.6	7.7	199	24	22	0.82	4	NA	Y	1	0	0	1	0	0.3	1.5	1	10	1	10	0	0	0	1.11	2	0.4	2.8	N	N

S.No.	MRD No	Name Initial	Age (years)	Gender	Date of inclusion	Duration of disease (years)	Education	Smoker	Other co-morbidity	Any other autoimmune disease	History of RA in family	If family history present which member	Erosions	RF	Value of RA Factor if available (IU/ml)	Anti CCP	Value of ANTICCP if available (IU/ml)	Nodules	ILD	SS	Neuropathy	Vasculitis	Skin	ANY OTHER EXTRA ARTUCULAR MANIFESTATION	First visit/follow up	BP (mm of Hg)	HEIGHT (inches)	WEIGHT (kg)	BMI (kg/m^2)	HR (bpm)
67	977533	R	39	F	20/10/20	18	M.A.	N	N	N	Y	MOTHER AND MATERNAL GRANDMOTHER	Y	P	128.1	N	NA	N	N	N	N	N	N	N	2	110/80	65	79	28.98	81
68	948903	KS	45	M	22/10/20	10	12	N	N	N	N	N	-	P	78.2	P	186	N	N	Y	N	N	N	N	2	126/66	69	82	26.70	73
69	972839	JK	64	F	31/10/20	12	4	N	N	N	N	N	-	P	42.3	NA	NA	N	Y	Y	N	N	N	N	2	140/80	61	70	29.16	105
70	982067	SS	57	M	31/10/20	16	10	N	N	N	N	N	-	P	39	NA	NA	N	N	Y	N	N	Y	N	1	130/80	68	89	29.83	99
71	960836	AS	44	F	11-06-2020	8	12	N	N	N	N	N	-	P	NA	N	NA	N	N	Y	N	N	N	N	1	138/88	65	81	29.72	79
72	64178	HS	35	M	11-07-2020	4	GRADUATE	N	N	N	N	N	-	P	104	NA	NA	N	N	N	N	N	N	N	1	120/60	67	75	25.90	70
73	925790	KS	48	M	11-12-2020	1	11	N	N	N	N	N	-	NA	NA	P	>500	N	N	N	N	N	N	N	2	130/80	72	120	35.88	93
74	956351	SS	55	F	11-12-2020	6	11	N	N	N	N	N	-	N	NA	N	<7	Y	N	Y	N	N	N	N	1	130/80	66	80	28.47	63
75	985951	GK	40	F	16/11/20	5	8	N	N	N	N	N	-	N	NA	P	>500	Y	N	Y	N	N	N	N	2	114/80	65	85	31.18	100
76	911860	TD	75	F	21/11/20	15	NA	N	Y DM	N	N	N	-	P	NA	NA	NA	N	N	Y	Y	N	N	HYPONATREMIA	2	120/70	64	67	25.35	64
77	714399	NK	44	F	24/11/20	2	GRADUATE	N	N	Y HYPOTHYROID	Y	SISTER	-	N	NA	P	NA	N	N	Y	Y	N	N	N	2	120/74	62	65	26.21	66
78	204228	N	27	F	24/11/20	1	10	N	Y TYPE 1 DM	Y TYPE 1 DM	N	N	-	P	NA	NA	NA	N	N	Y	N	N	N	N	2	104/70	58	40	18.43	82
79	992423	K	50	F	12-09-2020	7	12	N	N	N	N	N	-	P	18.8	P	22.78	N	N	Y	N	N	N	N	2	130/80	62	70	28.23	72
80	983745	C	40	F	12-12-2020	4	B.A.	N	N	N	Y	SISTER	-	P	71.5	NA	NA	N	N	N	Y	N	N	N	2	120/80	66	70	24.91	66
81	711885	BK	45	F	17/12/20	10	UNEDUCATED	N	N	N	N	N	-	P	16.11	NA	NA	N	N	Y	N	N	N	N	1	120/74	63	88	34.37	90
82	1008203	RK	66	F	01-04-2021	12	5	N	N	N	N	N	-	N	12.8	N	NA	N	N	Y	N	N	N	N	2	110/80	66	87	30.96	63
83	1008543	SK	42	F	01-05-2021	7	10	N	N	N	Y	MOTHER	-	N	11.7	N	NA	Y	N	Y	N	N	N	N	2	120/90	64	80	30.27	100
84	1008578	H	50	F	01-05-2021	10	6	N	N	N	N	N	-	N	13.5	N	<7	N	N	N	N	N	N	N	2	130/84	65	66	24.21	90
85	1004720	SD	55	F	01-06-2021	8	4	N	N	N	Y	MOTHER	-	P	NA	NA	NA	N	N	Y	Y	N	N	N	1	126/88	64	81	30.65	65
86	744603	PK	49	F	01-07-2021	11	12	N	N	N	N	N	-	P	87.2	NA	NA	Y	N	Y	N	N	N	N	2	140/90	66	91	32.38	67
87	426162	GS	50	M	01-08-2021	6	MATRIC	N	N	N	N	N	-	P	95	P	117.8	Y	N	Y	N	N	N	N	2	130/90	69	89	28.98	77
88	79931	JK	49	F	01-08-2021	7	12	N	Y DM	N	N	N	-	N	11.1	N	<7	Y	N	N	N	N	N	N	2	110/80	64	88	33.30	75
89	1009631	SL	71	F	01-08-2021	26	UNEDUCATED	N	N	N	N	N	-	P	90.19	P	72.19	Y	Y	Y	N	N	Y	N	1	130/90	63	69	26.95	78
90	191608	SS	35	F	14/1/21	6	12	N	N	N	N	N	-	N	10.7	N	<7	N	N	N	N	N	N	N	2	130/80	63	69	26.95	68
91	983026	MK	28	F	19/1/21	0.125	GRADUATE	N	N	Y HYPOTHYROID	N	N	-	P	187	N	NA	N	N	N	N	N	N	N	1	100/90	65	66	24.21	88
92	198530	GK	63	F	21/1/21	16	UNEDUCATED	N	N	N	N	N	-	P	NA	NA	NA	Y	N	Y	N	N	Y	N	2	110/90	63	70	27.34	90
93	1010925	AR	42	F	22/1/21	1	UNEDUCATED	N	N	N	N	N	-	P	44.4	NA	NA	N	N	Y	N	N	N	N	1	120/84	66	80	28.47	91
94	1009953	SB	18	F	25/1/21	1	STUDYING	N	N	N	N	N	-	N	11.1	N	<7	N	N	N	N	N	N	N	2	110/80	65	66	24.21	70
95	336619	RK	38	F	28/1/21	4	12	N	N	Y HYPOTHYROID	Y	PATERNAL AUNT	-	P	NA	NA	NA	N	N	N	N	N	N	N	2	130/80	62	68	27.42	60
96	759306	ND	57	F	28/1/21	2	8	N	Y CHOLELITHIASIS	N	N	N	-	P	46	NA	NA	Y	N	Y	N	N	N	N	1	120/84	64	85	32.17	69
97	1014460	V	27	F	28/1/21	4	GRADUATE	N	N	N	Y	MOTHER	-	P	NA	NA	NA	N	N	N	P	N	N	N	2	100/60	59	40	17.81	69
98	1018237	BK	55	F	28/1/21	2	UNEDUCATED	N	Y DM	N	N	N	-	P	NA	NA	NA	N	N	Y	N	N	N	N	2	120/86	60	88	37.89	91
99	1019747	SK	52	F	30/1/21	4	GRADUATE	N	N	N	N	N	-	P	188	NA	NA	N	N	N	N	N	N	N	1	1207/70	65	70	25.68	80
100	467181	HK	64	F	30/1/21	10	8	N	N	N	N	N	-	P	NA	NA	NA	N	N	Y	N	N	N	N	2	130/70	65	86	31.55	78
101	1019805	RK	52	F	30/1/21	28	6	N	Y DM, HTN	N	Y	SISTER	-	P	129	NA	NA	N	N	Y	N	N	N	N	1	150/80	63	82	32.02	80

S.No.	MRD No	PALLOR	DEFORMITY	ICTERUS/CYANOSIS/EDEMA/CLUBBING	Hb (gm/dl)	TLC (10^3/ul)	PLT COUNT (10^3/ul)	AST (U/l)	ALT (U/l)	CREATININE (mg/dl)	ESR (mm/hour)	CRP (mg/L) (OPTIONAL)	FULFILLING EULAR CRITERIA	RADAI 5 Q1	RADAI5 Q2	RADAI5 Q3	RADAI5 Q4	RADAI5 Q5	FN(0-10)	PAIN (0-10)	PGA (0-10cm) or ptge	PGA (0-100 mm)	EGA (0-10 cm)	EGA (0-100 mm)	EMS (min)	TJC	SJC	DAS 28	CDAI	RADAI 5	RAPID 3	Any other investigation	Any identified cause of flare
67	977533	N	Y	N/N/N/N	11.5	7.5	196	21	22	0.74	25	1.6	Y	6	4	3	2	1	0.7	5	2.5	25	1	10	30	1	0	3.16	4.5	3.2	8.2	N	N
68	948903	Y	N	N/N/N/N	13.2	12.4	255	20	22	0.8	38	31.76	Y	8	6	4	5	1	1.3	4	5	50	4	40	50	2	4	4.60	15	4.8	10.3	N	N
69	972839	Y	Y	N/N/N/N	12	5.9	178	22	22	0.94	13	NA	Y	8	4	5	6	1	1.7	4	6	60	3	30	35	0	1	2.92	10	4.8	11.7	N	N
70	982067	N	N	N/N/N/N	12.5	9.6	263	NA	NA	0.65	40	NA	Y	7	5	6	5	0	0.7	6	5	50	5	50	50	5	4	5.09	19	4.6	11.7	URIC ACID= 5.14	N
71	960836	N	Y	N/N/N/N	10.2	7.9	354	32	30	0.74	52	NA	Y	6	8	7	7	2	2	7	6	60	4	40	150	4	1	5.01	15	6	15	N	N
72	64178	N	N	N/N/N/N	12	8.7	322	20	20	0.57	47	NA	Y	6	5	4	4	1	1	4	5	50	4	40	50	1	5	4.58	15	4	10	N	N
73	925790	N	N	N/N/N/N	14	6.3	322	28	36	0.75	6	NA	Y	5	0	0	2	0	0.7	1	1	10	1	10	0	0	0	1.39	2	1.4	2.7	N	N
74	956351	N	N	N/N/N/N	12.1	8.8	298	75	86	0.3	49	10	Y	6	8	7	8	1	2.3	8	7	70	5	50	50	4	2	5.22	18	6	17.3	N	N
75	985951	N	N	N/N/N/N	12.8	6.4	193	28	32	0.5	44	10.52	Y	5	7	8	8	1	1	7	8	80	5	50	30	4	2	5.28	19	5.8	16	N	N
76	911860	N	Y	N/N/N/N	10	10.4	347	40	38	1.04	115	NA	Y	9	7	8	7	1	5.3	7.5	8.5	85	6	60	45	4	1	5.91	19.5	6.4	21.3	N	N
77	714399	N	N	N/N/N/N	13	8.1	328	34	77	0.5	18	1.3	Y	4	1	1	3	1	2	5	3	30	2	20	30	2	2	3.63	9	2	10	ANA (IF)=1+, ANA PROFILE WITH TITRE = NEGATIVE	WINTERS
78	204228	N	N	N/N/N/N	12.7	6.7	341	19	27	0.62	49	NA	Y	7	4	8	5	1	2.3	7	5	50	5	50	40	2	1	4.50	13	5	14.3	N	MISSING MEDICINE
79	992423	N	N	N/N/N/N	11.2	8	268	32	63	0.92	30	NA	Y	5	2	2	3	0	1	3.5	4.5	45	2.5	25	10	0	0	3.01	7	2.4	9	N	N
80	983745	N	Y	N/N/N/N	13.6	9.8	261	14	24	0.8	52	NA	Y	7	6	6	5	1	3.7	4	1	10	1	10	20	2	1	3.98	5	5	8.7	N	WINTER
81	711885	N	Y	N/N/N/N	11	5.6	289	18	14	0.6	67	40	Y	6	8	7	8	2	2	7.5	8	80	6.5	65	120	7	5	6.17	26.5	6.2	17.5	N	N
82	1008203	Y	N	N/N/N/N	12.2	13.6	480	24	35	0.65	90	NA	Y	7	8	9	8	2	2	7.5	8	80	7	70	120	7	5	6.38	27	6.8	17.5	URIC ACID=3.6, TSH=3.6	N
83	1008543	N	N	N/N/N/N	14.2	11.7	192	22	24	0.68	14	NA	Y	7	5	4	3	0	1	4	3	30	1.5	15	30	2	0	3.06	6.5	3.8	8	TSH=3.19	N
84	1008578	N	N	N/N/N/N	12.6	10	110	36	40	0.81	24	9.46	Y	6	4	3	3	0	1	4	3	30	3	30	30	3	1	3.89	10	3.2	8	N	N
85	1004720	Y	Y	N/N/N/N	9.4	7.2	234	40	36	0.71	56	NA	Y	6	7	8	7	1	1.7	7	7	70	4.5	45	30	4	1	5.20	16.5	5.8	15.7	N	N
86	744603	Y	Y	N/N/N/N	11	7.6	356	22	30	0.85	44	NA	Y	6	7	6	7	1	1.3	7	6	60	5	50	40	3	2	4.85	16	5.4	14.3	URIC ACID=4.4, TSH=6.41	N
87	426162	N	N	N/N/N/N	14.2	7	115	20	13	0.84	38	21.75	Y	5	6	4	4	1	1	5	4	40	3	30	30	3	0	4.08	10	4	10	N	N
88	79931	N	N	N/N/N/N	13.4	7.8	220	26	32	0.61	42	NA	Y	6	7	6	5	0	1	6	5	50	5	50	20	4	3	4.92	17	4.8	12	URIC ACID= 5.8, TSH=1.77	N
89	1009631	Y	Y	N/N/N/N	11.7	5.8	282	23	37	0.53	42	1.64	Y	6	5	4	5	0	1.7	6	5	50	4	40	20	4	1	4.72	14	4	12.7	URIC ACID=3.0	N
90	191608	Y	N	N/N/N/N	10.7	9.9	284	20	14	0.9	30	NA	Y	8	4	3	2	1	1	4	2	20	2	20	20	0	0	2.66	4	3.6	7	TSH=5.32	N
91	983026	N	N	N/N/N/N	11.2	6.6	365	22	22	0.55	28	NA	Y	7	6	5	4	1	0.3	5	3	30	2	20	20	1	0	3.31	6	4.6	8.3	N	N
92	198530	N	N	N/N/N/N	11.5	6.3	383	28	18	0.54	57	17	Y	6	7	8	7	1	1.7	7	6	60	4	40	30	4	1	5.07	15	5.8	14.7	N	N
93	1010925	Y	N	N/N/N/N	10.9	9.2	252	56	40	0.54	32	NA	Y	5	6	5	5	1	1	5	5	50	4	40	20	0	2	3.52	11	4.4	11	N	N
94	1009953	N	N	N/N/N/N	12.5	7.9	379	26	31	0.45	28	0.16	Y	5	4	3	2	0	1	4	3	30	2	20	20	1	1	3.59	7	2.8	8	N	N
95	336619	Y	N	N/N/N/N	12.7	6.08	291	38	25	0.76	38	NA	Y	4	0	0	1	0	0.3	1	1	10	1	10	0	0	0	2.69	2	1	2.3	N	N
96	759306	N	N	N/N/N/N	12	5	219	19	13	0.65	51	NA	Y	6	7	6	6	1	1.7	6	5.5	55	4	40	60	4	3	5.13	16.5	5.2	13.2	N	N
97	1014460	N	N	N/N/N/N	10.9	5.5	266	15	13	0.38	36	4.16	Y	8	7	6	5	0	2.7	8	7	70	3	30	25	1	0	4.05	11	5.2	17.7	N	REST
98	1018237	Y	Y	N/N/N/N	10.2	12.9	303	12	10	0.56	52	NA	Y	7	5	6	6	1	2	7.5	6	60	3	30	30	2	2	4.79	13	5	15.5	N	N
99	1019747	N	N	N/N/N/N	12.4	5	268	18	16	0.71	36	NA	Y	5	3	2	2	0	2	2	2	20	1	10	5	2	0	3.58	5	2.4	6	N	N
100	467181	N	Y	N/N/N/N	10.7	5.7	342	21	29	0.98	76	NA	Y	9	7	8	9	0	4.7	8	8.5	85	6.5	65	20	4	2	5.74	21	6.6	21.2	N	N
101	1019805	N	N	N/N/N/N	11.7	9.4	286	32	32	0.91	82	NA	Y	8	7	8	8	1	6.3	7.5	7.5	75	6	60	40	5	3	5.87	21.5	6.4	21.3	N	N

S.No.	MRD No	Name Initial	Age (years)	Gender	Date of inclusion	Duration of disease (years)	Education	Smoker	Other co-morbidity	Any other autoimmune disease	History of RA in family	If family history present which member	Erosions	RF	Value of RA Factor if available (IU/ml)	Anti CCP	Value of ANTICCP if available (IU/ml)	Nodules	ILD	SS	Neuropathy	Vasculitis	Skin	ANY OTHER EXTRA ARTUCULAR MANIFESTATION	First visit/follow up	BP (mm of Hg)	HEIGHT (inches)	WEIGHT (kg)	BMI (kg/m^2)	HR (bpm)
102	995002	KK	45	F	30/1/21	7	5	N	N	N	N	N	-	N	12.48	N	NA	N	N	Y	Y	N	N	N	1	130/84	60	70	30.14	84
103	684414	JK	66	F	30/1/21	15	10	N	Y HTN	N	N	N	-	P	319.6	NA	NA	Y	N	Y	N	N	N	N	2	130/80	65	84	30.82	84
104	1019682	A	43	F	30/1/21	6	M.A.	N	N	Y SUBCLINICAL HYPOTHYROID	Y	FATHER	-	P	NA	P	29	Y	N	Y	N	N	N	N	2	110/70	61	62	25.83	70
105	1021269	GK	80	F	02-02-2021	10	8	N	N	N	Y	SISTER	-	P	NA	N	NA	N	N	Y	Y	N	N	N	2	130/70	65	75	27.51	96
106	3964	HK	44	F	02-11-2021	16	GNM	N	N	N	Y	MOTHER	-	P	NA	P	181	Y	N	Y	N	N	N	N	2	110/90	63	70	27.34	97
107	986052	BK	50	F	02-11-2021	5	8	N	Y HTN	N	Y	MOTHER	-	N	NA	N	NA	N	N	Y	Y	N	N	N	2	120/80	60	61	26.26	66
108	889488	MK	44	F	16/2/21	3	12	N	N	N	N	N	-	P	NA	P	NA	N	N	N	N	N	N	N	2	120/80	63	55	21.48	84
109	50211	S	57	F	16/2/21	0.5	MATRIC	N	Y DM, HTN	N	N	N	-	N	NA	N	NA	N	N	N	N	N	N	N	2	130/70	61	55	22.91	64
110	622954	SK	44	M	16/2/21	10	MATRIC	N	N	N	Y	FATHER	-	P	NA	N	NA	N	N	Y	Y	N	N	N	2	120/70	65	60	22.01	92
111	1028915	GK	54	F	16/2/21	2	10	N	N	N	N	N	-	P	93.2	P	NA	Y	N	N	N	N	N	N	2	130/70	66	82	29.18	88
112	544366	G	29	F	16/2/21	3	M.A. , B.A.	N	N	N	N	N	-	N	NA	N	NA	N	N	Y	N	N	N	N	2	110/70	66	80	28.47	76
113	995879	SK	47	F	16/2/21	13	12	N	N	N	N	N	-	P	420.1	N	NA	N	N	Y	N	N	N	N	2	110/70	62	52	20.97	64
114	676654	JK	55	F	16/2/21	1.5	5	N	N	N	N	N	-	N	NA	N	NA	N	N	N	N	N	N	N	2	110/70	63	84	32.80	88
115	684831	LK	61	F	16/2/21	15	5	N	N	N	N	N	-	P	122	NA	NA	N	N	Y	N	N	N	N	1	130/70	62	76	30.65	89
116	762874	MK	56	F	18/2/21	10	8	N	N	N	N	N	-	NA	NA	P	>500	Y	N	Y	N	N	Y	N	2	120/86	66	89	31.67	96
117	144588	UK	60	F	18/2/21	14	10	N	Y HTN	N	N	N	-	P	NA	P	NA	Y	N	N	Y	N	N	N	2	130/70	63	60	23.43	77
118	64257	PK	63	F	20/2/21	26	10	N	N	Y HYPOTHYROID	N	N	-	N	NA	N	NA	Y	N	N	N	N	N	N	2	140/70	65	78	28.62	90
119	1013321	GK	42	F	20/2/21	1	7	N	N	Y HYPOTHYROID	N	N	-	N	11.7	N	<7	N	N	N	N	N	N	N	2	130/90	65	73	26.78	88
120	101528	SK	47	F	22/2/21	5	8	N	N	N	N	N	-	P	52	N	<7	N	N	Y	N	N	N	N	2	130/70	62	86	34.68	78
121	583381	L	39	F	22/2/21	2	GRADUATE	N	N	N	N	N	-	P	NA	P	NA	N	N	N	N	N	N	N	2	110/70	64	72	27.25	84
122	676123	S	60	M	23/2/21	5.5	9	N	N	N	N	N	-	P	200	P	188	Y	N	Y	N	N	N	N	1	130/70	69	69	22.46	90
123	579955	SK	67	F	23/2/21	10	UNEDUCATED	N	Y HTN	N	Y	MOTHER	-	P	NA	N	<7	N	N	N	N	N	N	N	2	130/70	63	86	33.59	72
124	999896	LK	55	F	23/2/21	6	10	N	N	N	N	N	-	P	118	NA	NA	Y	N	N	N	N	N	N	2	110/70	63	52	20.31	72
125	1033091	CK	50	F	23/2/21	20	UNEDUCATED	N	Y HTN	Y HYPOTHYROID	N	N	Y	P	189	NA	NA	N	N	Y	Y	N	N	N	1	140/70	64	56	21.19	88
126	93319	S	42	F	23/2/21	1.5	B.A.	N	N	Y HYPOTHYROID	Y	MOTHER	-	P	200	P	46	N	N	N	N	N	N	RIGHT MILD CARPAL TUNNEL SYNDROME	2	120/76	66	78	27.75	99
127	856981	K	58	F	25/2/21	11	10	N	N	N	N	N	-	N	NA	N	NA	N	N	Y	N	N	N	N	1	130/84	62	88	35.48	93
128	905249	JK	38	F	25/2/21	1	7	N	N	N	N	N	-	P	378	NA	NA	N	N	N	N	N	N	N	2	110/70	66	60	21.35	76
129	1018862	RK	48	F	25/2/21	10	MATRIC	N	N	Y HYPOTHYROID	N	N	-	N	NA	N	<7	N	N	Y	N	N	N	N	2	110/70	66	60	21.35	88
130	1011802	RRV	31	F	25/2/21	4	POST GRADUATE	N	N	N	N	N	-	P	NA	NA	NA	Y	N	Y	N	N	N	N	2	120/70	64	60	22.71	88
131	1014963	RS	32	M	25/2/21	2	8	Y	Y	Y	N	N	-	P	260	NA	NA	N	N	N	N	N	N	Y CHRONIC DVT	2	120/70	68	78	26.15	66
132	1046834	JK	50	F	03-10-2021	8	10	N	Y DM	N	N	N	-	P	106	NA	NA	Y	N	Y	N	N	N	N	2	150/80	64	88	33.30	90
133	782557	GD	49	F	19/3/21	12	10	N	N	N	N	N	-	P	NA	NA	NA	N	N	Y	N	N	N	N	2	120/80	64	96	36.33	90
134	1057179	AR	51	F	19/3/21	9	10	N	N	N	Y	COUSIN SISTER	-	P	212	NA	NA	N	N	Y	N	N	N	N	2	130/70	64	82	31.03	66
135	379027	VK	32	M	20/3/21	5	DIPLOMA	N	N	N	N	N	-	N	NA	N	NA	N	N	N	Y	N	N	N	2	120/80	68	83	27.82	62
136	465652	JK	39	F	22/3/21	6	12	N	N	N	N	N	-	P	NA	N	NA	N	N	N	N	N	N	N	2	110/70	62	68	27.42	90
137	1070431	HK	53	F	31/3/21	8	8	N	N	N	Y	MOTHER	-	P	106.5	NA	NA	N	N	Y	N	N	N	N	1	130/70	65	82	30.08	88

S.No.	MRD No	PALLOR	DEFORMITY	ICTERUS/CYANOSIS/EDEMA/CLUBBING	Hb (gm/dl)	TLC (10^3/ul)	PLT COUNT (10^3/ul)	AST (U/l)	ALT (U/l)	CREATININE (mg/dl)	ESR (mm/hour)	CRP (mg/L) (OPTIONAL)	FULFILLING EULAR CRITERIA	RADAI 5 Q1	RADAI5 Q2	RADAI5 Q3	RADAI5 Q4	RADAI5 Q5	FN(0-10)	PAIN (0-10)	PGA (0-10cm) or ptge	PGA (0-100 mm)	EGA (0-10 cm)	EGA (0-100 mm)	EMS (min)	TJC	SJC	DAS 28	CDAI	RADAI 5	RAPID 3	Any other investigation	Any identified cause of flare
102	995002	N	Y	N/N/N/N	12.3	6	326	32	28	0.71	64	NA	Y	6	6	6	6	1	4.3	7	6.5	65	5	50	60	4	2	5.34	17.5	5	17.8	N	WINTERS, STRESS,FATIGUE OR OVEREXERTION
103	684414	N	Y	N/N/N/N	11.2	4	410	24	28	0.81	68	NA	Y	9	7	6	8	1	4.7	8.5	7.5	75	5.5	55	45	4	3	5.61	20	6.2	20.7	N	WINTERS
104	1019682	Y	Y	N/N/N/N	11.6	7.1	238	28	18	1.01	56	NA	Y	8	6	6	5	1	3	7	5.5	55	3	30	30	3	2	4.95	13.5	5.2	15.5	URIC ACID= 6.4	N
105	1021269	N	Y	N/N/N/N	11	6.7	312	40	36	0.98	36	NA	Y	5	4	3	5	0	3	6	5.5	55	4	40	15	1	0	3.84	10.5	3.4	14.5	N	N
106	3964	Y	Y	N/N/N/N	10.5	7.8	293	18	14	0.55	47	NA	Y	7	7	7	7	2	4.3	8	7.5	75	6	60	90	4	2	5.26	19.5	6	19.8	N	WINTERS
107	986052	Y	N	N/N/N/N	9.8	6	233	36	32	0.89	18	NA	Y	3	1	3	4	0	1.3	5	4.5	45	2.5	25	5	1	0	3.21	8	2.2	10.8	N	N
108	889488	N	Y	N/N/N/N	11	6	231	39	29	0.91	32	NA	Y	3	3	5	3	0	1.7	5	4	40	1.5	15	15	3	1	4.24	9.5	2.8	10.7	N	WINTERS
109	50211	N	N	N/N/N/N	10.8	4.2	120	39	20	0.99	18	NA	Y	5	2	3	2	0	2	3	2	20	1	10	10	0	0	2.30	3	2.4	7	N	N
110	622954	N	N	N/N/N/N	11.7	6	281	31	25	1	28	NA	Y	5	7	7	4	1	1	6	5	50	3	30	20	3	1	4.28	12	4.8	12	N	N
111	1028915	N	N	N/N/N/N	12.6	5.6	231	27	13	0.68	38	NA	Y	8	7	8	7	0	3.7	8	7.5	75	6	60	15	3	2	4.96	18.5	6	19.2	N	WINTERS
112	544366	N	N	N/N/N/N	10	10.7	273	20	25	0.6	40	21.33	Y	4	6	4	5	0	0.3	4	5	50	1.5	15	5	1	1	4.12	8.5	3.8	9.3	N	WINTERS
113	995879	N	Y	N/N/N/N	9.3	8.25	592	19	10	0.39	88	NA	Y	9	6	7	5	1	5.3	7	5.5	55	7	70	40	3	0	4.87	15.5	5.6	17.8	N	N
114	676654	N	N	N/N/N/N	10.9	7.7	209	28	21	0.63	21	NA	Y	4	0	1	0	0	0	2	1	10	1	10	0	0	0	2.27	2	1	3	N	N
115	684831	N	Y	N/N/N/N	8.9	9.8	509	25	23	0.83	78	NA	Y	6	6	7	5	1	5	7	5	50	6	60	40	7	3	5.72	21	5	17	N	N
116	762874	N	N	N/N/N/N	12	11	405	17	21	1.01	105	NA	Y	7	8	9	9	2	2.3	8	9	90	7	70	120	6	3	6.37	25	7	19.3	N	N
117	144588	N	N	N/N/N/N	11.2	8.2	330	24	17	0.84	40	NA	Y	5	0	2	1	0	2	4	2	20	1	10	10	2	1	3.93	6	1.6	8	N	N
118	64257	N	Y	N/N/N/N	13.9	6.5	271	20	13	0.6	10	2.3	Y	3	0	1	2	0	2	1	1.5	15	1	10	0	2	0	2.61	4.5	1.2	4.5	N	N
119	1013321	N	N	N/N/N/N	10.9	11.9	493	23	36	0.56	35	16.3	Y	7	7	8	4	1	3.7	8	4.5	45	4	40	30	5	7	5.11	20.5	5.4	16.2	ANA=NEGATIVE	N
120	101528	N	N	N/N/N/N	11	6.1	198	28	24	0.71	62	NA	Y	8	7	8	8	1	2	7	6	60	6	60	40	6	7	5.84	25	6.4	15	N	N
121	583381	N	N	N/N/N/N	12.3	7	251	7	12	0.72	36	NA	Y	6	3	4	5	1	1	4	4.5	45	4	40	40	3	5	4.73	16.5	3.8	9.5	N	N
122	676123	N	Y	N/N/N/N	12.8	5.5	160	20	19	0.58	20	NA	Y	1	0	1	1	0	0.3	1	1	10	1	10	15	2	2	3.42	6	0.6	2.3	N	WINTERS
123	579955	N	N	N/N/N/N	10.5	4.7	297	64	47	1	56	4.71	Y	5	6	7	8	1	4	7	8	80	5.5	55	40	6	3	5.79	22.5	5.4	19	N	N
124	999896	N	N	N/N/N/N	9.1	5.8	410	25	30	0.59	70	NA	Y	5	5	7	3	1	1.3	5	4.5	45	4.5	45	60	1	3	4.65	13	4.2	10.8	URIC ACID=4.6	N
125	1033091	N	Y	N/N/N/N	11	12.7	342	22	23	0.51	10	NA	Y	5	4	8	8	0	5.7	7	9	90	5	50	15	5	5	4.75	24	5	21.7	N	WINTERS
126	93319	N	N	N/N/N/N	11.2	6.6	334	25	21	0.71	60	16.68	Y	1	10	10	9	1	2.3	8.5	9	90	7.5	75	60	6	7	6.24	29.5	6.2	19.8	ANA(IF)= NEGATIVE	N
127	856981	Y	N	N/N/N/N	10.2	6.2	120	16	27	0.7	13	NA	Y	6	4	3	3	0	1	3	4	40	2	20	20	3	6	4.01	15	3.2	8	N	N
128	905249	N	N	N/N/N/N	10.9	4.3	327	14	16	0.7	32	0.5	Y	4	5	5	5	0	1	4	5	50	2	20	15	4	4	4.81	15	3.8	10	N	N
129	1018862	N	N	N/N/N/N	12.9	8.2	271	23	22	1.1	29	NA	Y	5	5	5	6	0	4	6	7	70	4	40	20	5	6	5.28	22	4.2	17	ANA-NEGATIVE	N
130	1011802	N	N	N/N/N/N	10.7	9.8	605	70	40	0.61	35.9	NA	Y	5	10	10	8	2	2.7	10	8	80	6.5	65	90	1	2	4.58	17.5	7	20.7	N	N
131	1014963	N	N	N/N/N/N	13.9	8.1	150	27	40	0.8	42	34.05	Y	4	5	5	5	0	1	4.5	5	50	4	40	0	1	1	4.16	11	3.8	10.5	N	N
132	1046834	Y	Y	N/N/N/N	10.5	5	214	23	28	0.8	50	NA	Y	7	6	5	6	2	1.7	5	6	60	4	40	120	2	4	4.93	16	5.2	12.7	N	N
133	782557	Y	Y	N/N/N/N	10	9.1	254	32	28	1.01	52	NA	Y	8	7	8	8	1	2.3	7	7	70	5	50	25	4	2	5.26	18	6.4	16.3	N	N
134	1057179	Y	Y	N/N/N/N	11	6	389	12	16	0.96	52	NA	Y	6	6	5	5	1	3.7	5	5.5	55	3.5	35	40	6	2	5.30	17	4.6	14.2	N	N
135	379027	N	Y	N/N/N/N	14.1	7.2	238	23	19	0.69	46	21.65	Y	5	2	2	2	0	0	2	2	20	0.5	5	15	3	1	4.21	6.5	2.2	4	N	FATIGUE OR OVEREXERTION
136	465652	N	N	N/N/N/N	13.5	8	260	13	27	0.82	14	NA	Y	3	1	0	1	0	0.7	1.5	1.5	15	1.5	15	0	1	0	2.62	4	1	3.7	N	N
137	1070431	N	N	N/N/N/N	11.8	7.7	367	15	20	0.63	73	123.36	Y	8	7	9	8	1	3.7	9	8.5	85	7.5	75	40	9	8	6.67	33	6.6	21.2	HBA1c=6.5	N

S.No.	MRD No	Name Initial	Age (years)	Gender	Date of inclusion	Duration of disease (years)	Education	Smoker	Other co-morbidity	Any other autoimmune disease	History of RA in family	If family history present which member	Erosions	RF	Value of RA Factor if available (IU/ml)	Anti CCP	Value of ANTICCP if available (IU/ml)	Nodules	ILD	SS	Neuropathy	Vasculitis	Skin	ANY OTHER EXTRA ARTUCULAR MANIFESTATION	First visit/follow up	BP (mm of Hg)	HEIGHT (inches)	WEIGHT (kg)	BMI (kg/m^2)	HR (bpm)
138	612093	TS	33	M	04-06-2021	3	10	N	N	N	N	N	-	P	NA	P	>200	N	N	N	N	N	N	N	2	110/70	66	58	20.64	68
139	51241	AG	50	F	04-06-2021	6	10	N	N	N	N	N	-	P	38	-	<7	N	N	N	N	N	N	N	2	110/80	61	62	25.83	66
140	1016080	N	52	F	04-06-2021	5	12	N	N	N	N	N	-	N	NA	N	<7	N	N	N	N	N	N	N	2	110/70	65	70	25.68	88
141	669717	S	38	F	04-06-2021	8	8	N	N	N	N	N	-	P	123	--	NA	N	N	N	N	N	N	N	2	110/70	63	55	21.48	88
142	1046031	R	58	F	04-10-2021	8	12	N	N	N	N	N	-	NA	NA	P	309.7	N	N	Y	N	N	N	N	2	110/70	63	68	26.56	82
143	785570	DC	50	M	13/4/21	6	GRADUATE	N	N	N	N	N	-	P	NA	NA	NA	N	N	Y	N	N	N	N	2	120/70	67	84	29.00	64
144	408245	HK	75	F	14/4/21	12	8	N	Y HTN	N	Y	MOTHER	-	P	212	NA	NA	N	N	Y	N	N	N	N	2	140/70	64	90	34.06	80
145	848192	RK	41	F	14/4/21	4	12	N	N	N	N	N	-	P	NA	NA	NA	N	N	N	N	N	N	N	2	120/70	65	80	29.35	96
146	903921	S	37	F	15/4/21	3	10	N	N	Y HYPOTHYROID	N	N	-	P	106	NA	NA	N	N	N	Y	N	N	N	2	110/70	63	73	28.51	70
147	1086321	NS	50	F	15/4/21	20	8	N	Y DM, HTN	N	N	N	-	P	NA	NA	NA	N	N	N	N	N	N	N	2	130/70	65	90	33.02	88
148	46122	RG	23	M	15/4/21	3	STUDYING	N	N	N	Y	FATHER, PATERNAL AUNT	-	P	258	NA	NA	Y	N	N	Y	N	N	N	2	120/70	67	60	20.72	80
149	1066031	MK	35	F	15/4/21	1	12	N	N	N	N	N	-	P	NA	NA	NA	Y	N	N	N	N	N	N	2	110/70	67	55	18.99	88
150	1033002	VPK	44	F	15/4/21	8	5	N	N	N	N	N	-	P	82	NA	NA	Y	N	N	N	N	N	N	2	110/70	63	60	23.43	88
151	1077432	PK	57	F	15/4/21	6	UNEDUCATED	N	N	N	N	N	-	P	153	NA	NA	N	N	Y	N	N	N	N	2	110/70	66	70	24.91	80
152	1079841	HK	64	F	15/4/21	14	5	N	Y HTN	N	Y	MOTHER AND DAUGHTER	-	P	NA	N	NA	Y	N	Y	Y	N	N	N	2	120/70	63	55	21.48	74
153	874988	RD	53	F	15/4/21	2	5	N	N	Y HYPOTHYROID	N	N	-	P	NA	P	102	N	N	Y	N	N	N	N	2	120/70	65	85	31.18	62
154	1079602	PK	30	F	16/4/21	3	12	N	N	N	N	N	-	N	NA	N	10.84	Y	N	N	N	N	N	N	2	110/70	64	55	20.81	68
155	1016728	DK	52	F	16/4/21	3	12	N	Y DM	Y HYPOTHYROID	N	N	-	P	NA	-	NA	N	N	N	Y	N	N	N	2	120/70	67	64	22.10	88
156	1041980	SD	50	F	16/4/21	1	8	N	N	N	N	N	-	P	NA	NA	NA	Y	N	N	N	N	N	N	2	110/70	63	60	23.43	88
157	543208	PT	37	F	16/4/21	6	12	N	N	N	N	N	-	P	526	NA	NA	Y	N	N	N	N	N	N	2	100/60	61	45	18.74	64
158	29920	SD	22	F	23/4/21	4	4	N	N	N	N	N	-	P	NA	NA	NA	N	N	N	N	N	N	N	2	110/70	62	58	23.39	76
159	1063868	GK	37	F	29/4/21	4	10	N	Y HTN	N	N	N	-	P	235	NA	NA	N	N	Y	N	N	N	N	2	130/70	64	80	30.27	76
160	78659	R	34	F	05-06-2021	3	8	N	N	N	N	N	-	P	865	P	114	N	N	Y	Y	N	N	N	2	110/70	62	75	30.24	84
161	925761	JK	31	F	05-06-2021	1	12	N	N	N	N	N	-	N	NA	N	NA	Y	N	Y	N	N	N	N	2	110/70	68	70	23.46	80
162	956971	SK	45	F	06-09-2021	3	UNEDUCATED	N	N	N	N	N	-	P	NA	NA	NA	N	N	Y	N	N	N	N	1	120/70	63	70	27.34	66
163	619001	AG	64	F	06-12-2021	10	8	N	Y HTN	N	N	N	-	P	NA	NA	NA	N	N	Y	N	N	N	N	2	140/70	65	88	32.28	91
164	930734	KK	43	F	15/6/21	4	B.A.	N	N	N	N	N	Y	P	242	P	>200	N	N	Y	N	N	N	N	2	120/70	65	58	21.28	62
165	1090723	PK	50	F	15/6/21	8	UNEDUCATED	N	Y HTN	N	Y	SISTER	-	P	>200	N	NA	N	N	Y	N	N	N	N	2	130/90	65	79	28.98	81
166	983358	K	46	F	15/6/21	1	UNEDUCATED	N	N	N	N	N	-	P	86	NA	NA	N	N	N	N	N	N	N	2	110/70	67	65	22.44	66
167	248844	DK	45	F	15/6/21	12	10	N	N	N	N	N	-	P	NA	N	NA	Y	N	N	N	N	N	N	2	120/70	67	63	21.75	96
168	21695	PS	70	F	18/6/2021	8	UNEDUCATED	N	Y ANTI HCV REACTIVE	N	N	N	-	P	23.6	NA	NA	N	N	Y	N	N	N	N	2	110/70	64	60	22.71	70
169	1087387	MR	35	F	19/6/21	3	12	N	N	Y HYPOTHYROID	N	N	-	P	NA	NA	NA	N	N	N	N	N	N	N	2	120/80	65	66	24.21	90
170	822561	ND	51	F	07-08-2021	10	UNEDUCATED	N	N	N	N	N	-	P	95	NA	NA	Y	N	Y	Y	N	N	N	2	110/70	60	71.3	30.70	110

S.No.	MRD No	PALLOR	DEFORMITY	ICTERUS/CYANOSIS/EDEMA/CLUBBING	Hb (gm/dl)	TLC (10^3/ul)	PLT COUNT (10^3/ul)	AST (U/l)	ALT (U/l)	CREATININE (mg/dl)	ESR (mm/hour)	CRP (mg/L) (OPTIONAL)	FULFILLING EULAR CRITERIA	RADAI 5 Q1	RADAI5 Q2	RADAI5 Q3	RADAI5 Q4	RADAI5 Q5	FN(0-10)	PAIN (0-10)	PGA (0-10cm) or ptge	PGA (0-100 mm)	EGA (0-10 cm)	EGA (0-100 mm)	EMS (min)	TJC	SJC	DAS 28	CDAI	RADAI 5	RAPID 3	Any other investigation	Any identified cause of flare
138	612093	N	N	N/N/N/N	14.9	8.3	163	28	41	0.87	12	NA	Y	3	0	0	0	0	0	0	0	0	0	0	0	1	2.02	1	0.6	0	N	N
139	51241	N	N	N/N/N/N	13.8	9.9	178	13	11	0.91	41	NA	Y	8	5	5	6	1	3.3	6.5	7	70	4.5	45	30	9	6	5.95	26.5	5	16.8	N	N
140	1016080	N	N	N/N/N/N	13.7	9.8	218	36	42	0.81	52	NA	Y	7	6	7	5	1	3	7	7	70	4.5	45	30	7	6	5.91	24.5	5.2	17	ANA-NEGATIVE	N
141	669717	N	N	N/N/N/N	11.8	10.8	266	14	24	0.59	32	NA	Y	7	2	4	2	1	2	5	4	40	3	30	40	1	0	3.55	8	3.2	11	N	CERATIN TYPES OF FOOD
142	1046031	N	N	N/N/N/N	10.8	5.1	251	17	16	0.57	23	NA	Y	5	1	2	2	0	1	2	1	10	1	10	0	0	1	2.61	3	2	4	ANA PROFILE-NEGATIVE	FATIGUE OR OVEREXERTION
143	785570	N	N	N/N/N/N	12.9	6	258	36	28	0.91	52	NA	Y	8	6	7	5	1	2.7	7.5	6	60	5	50	25	5	7	5.60	23	5.4	16.2	N	N
144	408245	N	Y	N/N/N/N	13.6	6.6	170	46	36	0.81	62	NA	Y	6	8	6	6	1	3.3	6	6	60	6	60	45	8	4	5.87	24	5.4	15.3	N	N
145	848192	N	Y	N/N/N/N	10.4	6	130	32	26	0.81	12	4.4	Y	5	2	3	3	0	1.7	3	3	30	1	10	10	0	1	2.44	5	2.6	7.7	N	N
146	903921	N	N	N/N/N/N	9.9	6.6	324	23	18	1	26	8.1	Y	5	5	6	6	2	0.3	6	6	60	3	30	60	2	1	4.19	12	4.8	12.3	N	N
147	1086321	N	N	N/N/N/N	9.9	11	433	32	28	0.81	62	35.6	Y	8	6	6	8	2	4.7	6	8.5	85	6	60	45	6	6	6.14	26.5	6	19.2	N	FOOD
148	46122	N	N	N/N/N/N	13.8	5.6	288	31	28	0.62	26	3.78	Y	9	2	2	1	0	2	1.5	1	10	1	10	5	5	2	4.07	9	2.8	4.5	N	FOOD
149	1066031	N	N	N/N/N/N	13.1	7.1	168	26	29	0.45	95	NA	Y	9	8	7	5	1	2	6	5	50	4	40	30	6	2	5.66	17	6	13	N	N
150	1033002	N	N	N/N/N/N	12.8	6.7	268	17	19	0.65	10	NA	Y	5	2	2	1	0	0.7	1	1	10	1	10	0	1	2	2.71	5	2	2.7	URINE R/E-WNL	N
151	1077432	N	N	N/N/N/N	12.5	5.6	209	32	28	0.66	30	NA	Y	8	5	6	6	1	3.3	5	6	60	4	40	30	2	3	4.50	15	5.2	14.3	N	CHANGE OF WEATHER
152	1079841	N	Y	N/N/N/N	12.3	5.1	168	19	34	0.66	16	NA	Y	8	5	5	6	0	4.7	5	6	60	5	50	20	4	4	4.46	19	4.8	15.7	URINE R/E-WNL	N
153	874988	N	N	N/N/N/N	13.2	7.1	238	69	43	0.8	40	NA	Y	8	7	8	6	1	3.7	6	6	60	5	50	45	3	5	5.02	19	6	15.7	N	N
154	1079602	N	N	N/N/N/N	12.3	8.9	584	9	15	0.61	77	NA	Y	8	7	7	4	0	1	6	4	40	3	30	15	5	7	5.59	19	5.2	11	N	N
155	1016728	N	Y	N/N/N/N	10.4	6.9	213	21	17	0.61	120	NA	Y	6	5	7	5	2	5	6	5	50	4	40	90	3	4	5.58	16	5	16	TSH=5.2	FATIGUE OR OVEREXERTION
156	1041980	N	N	N/N/N/N	11.6	6	238	44	28	0.87	42	NA	Y	8	5	6	3	1	3.3	5	4	40	3	30	30	2	5	4.59	14	4.6	12.3	N	N
157	543208	N	Y	N/N/N/N	10.4	6.8	150	26	26	0.59	62	NA	Y	3	4	3	3	0	1	3	3	30	3	30	0	0	1	3.59	7	2.6	7	N	N
158	29920	N	N	N/N/N/N	10.3	8.3	232	20	26	0.41	42	NA	Y	5	4	3	4	0	1.7	4	4	40	3	30	15	0	3	3.66	10	3.2	9.7	N	N
159	1063868	N	N	N/N/N/N	11.3	7.4	220	16	22	0.52	58	NA	Y	7	6	7	5	1	2	7	5	50	3.5	35	50	2	5	4.96	15.5	5.2	14	N	N
160	78659	N	N	N/N/N/N	8.5	4.6	197	20	20	0.53	82	NA	Y	8	5	4	5	0	4	5	6	60	7	70	10	0	4	4.48	17	4.4	15	N	RELIEVING FACTOR-PREGNANCY
161	925761	N	N	N/N/N/N	11.3	7	354	24	20	0.77	18	NA	Y	9	5	6	5	0	2	4	5	50	5	50	15	3	7	4.43	20	5	11	ANA-NEGATIVE	N
162	956971	N	N	N/N/N/N	11.6	7.2	233	21	20	0.81	72	NA	Y	8	7	7	6	0	2.3	7.5	6.5	65	4	40	15	2	5	5.32	17.5	5.6	16.3	N	N
163	619001	N	N	N/N/N/N	13	6	201	28	28	0.66	32	9.24	Y	7	5	5	4	1	1.7	4	4.5	45	3	30	30	2	0	3.85	9.5	4.4	10.2	N	N
164	930734	N	N	N/N/N/N	12.6	9	290	27	22	0.73	45	NA	Y	5	0	1	1	0	1	0.5	1	10	1	10	0	0	1	3.08	3	1.4	2.5	N	N
165	1090723	N	N	N/N/N/N	12.4	9.8	190	38	45	0.9	10	NA	Y	2	4	4	3	0	3	4	3.5	35	2.5	25	5	0	1	2.38	7	2.6	10.5	N	FATIGUE OR OVEREXERTION
166	983358	Y	N	N/N/N/N	9.1	9.5	326	55	51	0.87	53	NA	Y	8	6	6	4	1	1.7	6	3.5	35	3	30	25	7	8	5.54	21.5	5	11.2	N	WINTERS
167	248844	N	Y	N/N/N/N	11.7	7.6	230	29	19	0.71	44	NA	Y	8	2	2	1	0	1	5	1	10	1	10	0	2	2	3.98	6	2.6	7	N	N
168	21695	N	Y	N/N/N/N	10.7	12	388	68	61	0.92	24	NA	Y	8	4	5	3	1	0.7	5	4	40	2	20	30	0	1	3.06	7	4.2	9.7	USG-FATTY LIVER GRADE I	WINTERS
169	1087387	N	N	N/N/N/N	12	5.6	214	16	22	0.45	39	NA	Y	6	4	3	3	1	1	4	3	30	3	30	40	3	5	4.58	14	3.4	8	N	N
170	822561	N	N	N/N/N/N	11.8	11.5	283	45	39	1.1	65	NA	Y	8	8	7	8	2	4	9.5	8.5	85	7	70	45	7	9	6.43	31.5	6.6	22	N	N

S.No.	MRD No	Name Initial	Age (years)	Gender	Date of inclusion	Duration of disease (years)	Education	Smoker	Other co-morbidity	Any other autoimmune disease	History of RA in family	If family history present which member	Erosions	RF	Value of RA Factor if available (IU/ml)	Anti CCP	Value of ANTICCP if available (IU/ml)	Nodules	ILD	SS	Neuropathy	Vasculitis	Skin	ANY OTHER EXTRA ARTUCULAR MANIFESTATION	First visit/follow up	BP (mm of Hg)	HEIGHT (inches)	WEIGHT (kg)	BMI (kg/m^2)	HR (bpm)
171	1135465	G	32	F	07-12-2021	4	8	N	N	Y HYPOTHYROID	N	N	-	NA	NA	P	388.2	Y	N	Y	N	N	N	N	1	114/70	63	62.5	24.41	60
172	22933	KD	44	F	27/7/21	2.5	4	N	N	N	N	N	-	P	NA	NA	NA	N	N	Y	N	N	N	N	2	140/90	63	84	32.80	88
173	161692	NR	59	F	27/7/21	12	8	N	Y DM	N	Y	MOTHER	-	P	LOW POSITIVE	P	HIGH POSITIVE	Y	N	Y	N	N	N	N	2	110/70	65	59	21.65	84
174	216218	SCG	76	M	27/7/21	40	12	N	N	N	N	N	-	P	NA	NA	NA	N	N	Y	N	N	N	N	2	120/80	63	72	28.12	86
175	1121573	LK	28	F	27/7/21	2	GRADUATE	N	N	N	N	N	-	P	212	NA	NA	N	N	Y	N	N	N	N	2	100/70	63	45	17.57	84
176	1006101	SK	45	F	27/7/21	9	UNEDUCATED	N	Y HEP C REACTIVE	N	N	N	-	N	NA	P	>500	N	N	Y	N	N	N	N	2	110/70	64	65	24.60	84
177	908780	KK	56	F	31/7/21	5	B.A.	N	Y HTN, NEPHROLITHIASIS	N	Y	SISTER	-	P	NA	N	NA	N	N	N	N	N	N	N	2	140/80	63	84	32.80	106
178	635707	BD	65	F	31/7/21	3	UNEDUCATED	N	N	N	N	N	-	P	NA	NA	NA	N	N	N	Y	N	N	N	2	130/70	64	56	21.19	86
179	463423	RD	30	F	31/7/21	3	12	N	N	N	N	N	-	N	NA	N	NA	N	N	Y	N	N	N	N	2	100/86	62	60	24.19	94
180	827300	K	40	F	08-06-2021	10	GRADUATE	N	Y HTN	N	N	N	-	NA	NA	P	500	Y	N	Y	N	N	N	HYPONATREMIA	2	120/70	64	85	32.17	97
181	916390	GK	17	F	21/8/21	0.5	STUDYING	N	Y PCOD	N	N	N	-	P	187	P	>340	N	N	Y	Y	N	N	N	2	90/60	62	63	25.40	69
182	1165718	KK	48	F	09-02-2021	0.5	GRADUATE	N	Y DM	N	N	N	-	P	65	NA	NA	Y	N	Y	Y	N	N	TENDON RUPTURE	1	130/90	62	77	31.05	72
183	1165620	SK	60	F	09-02-2021	9	3	N	N	N	N	N	-	N	NA	P	NA	Y	Y	Y	N	N	N	N	2	140/90	64	87	32.92	101
184	1175514	SS	59	M	18/9/21	2	GRADUATE	N	N	N	N	N	-	P	NA	NA	NA	Y	N	Y	N	N	N	N	1	130/80	68	82	27.49	70
185	1176406	MB	56	F	20/9/21	8	8	N	N	N	N	N	-	NA	NA	P	156.8	N	N	Y	N	N	N	N	1	110/70	65	72	26.41	80
186	1178484	GK	60	F	23/9/21	9	10	N	N	N	N	N	-	N	NA	N	NA	Y	N	Y	Y	N	Y	N	2	130/80	63	60	23.43	77
187	1162962	BP	40	F	24/9/21	18	10	N	N	N	N	N	-	P	>120	NA	NA	Y	N	Y	Y	N	N	N	2	100/70	62	66	26.61	90
188	1023145	NR	52	F	24/9/21	7	8	N	N	Y HYPOTHYROID	N	N	-	P	105.44	NA	NA	Y	N	Y	Y	N	Y	N	2	120/70	62	76	30.65	90
189	688356	JK	47	F	28/9/21	24	7	N	N	N	N	N	-	P	NA	NA	NA	Y	N	Y	N	N	N	N	2	122/84	66	70	24.91	81
190	1181236	PK	52	F	28/9/21	6	10	N	N	N	N	N	-	P	NA	NA	NA	N	Y	Y	N	Y	Y	N	1	140/90	62	82	33.06	92
191	1181209	PK	48	F	28/9/21	18	12	N	Y HTN	N	N	N	-	P	130.2	NA	NA	N	N	Y	N	N	N	N	1	128/78	60	79	34.01	67
192	1124936	DK	39	F	28/9/21	3	7	N	N	N	N	N	-	P	29.2	P	177	N	N	N	N	N	N	N	1	130/70	64	80	30.27	114
193	926074	GK	44	F	28/9/21	6	4	N	N	N	N	N	-	P	NA	NA	NA	N	Y	Y	N	N	N	N	2	124/80	62	66	26.61	83
194	1126936	CK	51	F	28/9/21	7	8	N	N	Y HYPOTHYROID	N	N	-	P	NA	NA	NA	N	N	Y	N	N	N	LEFT CARPAL TUNNEL SYNDROME	2	130/84	65	74	27.15	87
195	1144649	KK	40	F	28/9/21	1	8	N	N	N	N	N	-	P	176	NA	NA	Y	N	Y	Y	N	N	N	2	110/68	62	69	27.82	79
196	661518	PR	64	F	28/9/21	14	UNEDUCATED	N	N	N	N	N	-	P	NA	NA	NA	N	N	Y	N	N	N	N	2	120/62	60	78	33.58	99
197	1130324	B	48	F	10-05-2021	3	5	N	N	N	N	N	-	P	NA	NA	NA	Y	N	Y	Y	Y	Y	N	2	110/90	65	77	28.25	86
198	189602	JS	65	M	10-05-2021	5	4	N	Y HTN	N	N	N	-	P	NA	NA	NA	N	N	Y	Y	N	N	N	2	160/90	67	80	27.62	99
199	1185732	JK	36	F	10-05-2021	5	5	N	N	N	N	N	-	NA	NA	P	NA	N	N	Y	N	N	N	N	2	130/70	62	55	22.18	102
200	584867	KS	50	M	14/10/21	1	MATRIC	N	Y DM	N	N	N	-	N	16.3	P	>500	N	N	N	Y	N	N	N	2	130/70	65.5	70	25.29	100

S.No.	MRD No	PALLOR	DEFORMITY	ICTERUS/CYANOSIS/EDEMA/CLUBBING	Hb (gm/dl)	TLC (10^3/ul)	PLT COUNT (10^3/ul)	AST (U/l)	ALT (U/l)	CREATININE (mg/dl)	ESR (mm/hour)	CRP (mg/L) (OPTIONAL)	FULFILLING EULAR CRITERIA	RADAI 5 Q1	RADAI5 Q2	RADAI5 Q3	RADAI5 Q4	RADAI5 Q5	FN(0-10)	PAIN (0-10)	PGA (0-10cm) or ptge	PGA (0-100 mm)	EGA (0-10 cm)	EGA (0-100 mm)	EMS (min)	TJC	SJC	DAS 28	CDAI	RADAI 5	RAPID 3	Any other investigation	Any identified cause of flare
171	1135465	Y	Y	N/N/N/N	10	7.5	372	16	13	0.66	68	NA	Y	6	7	8	7	1	2	6	7	70	5	50	30	4	2	5.45	18	5.8	15	N	N
172	22933	Y	N	N/N/N/N	8.6	10.4	228	19	21	0.53	86	NA	Y	10	7	8	8	1	6	9	8.5	85	5	50	40	8	7	6.63	28.5	6.8	23.5	N	N
173	161692	N	Y	N/N/N/N	11.03	5.6	79	69	62	0.9	61	NA	Y	8	7	8	8	1	1.7	6	7	70	5	50	60	6	2	5.63	20	6.4	14.7	SPE-NO M SPIKE	FATIGUE OR OVEREXERTION
174	216218	N	Y	N/N/N/N	10.3	7.7	247	17	11	0.7	76	68	Y	8	6	8	5	0	2.7	7	5	50	4	40	10	4	4	5.41	17	5.4	14.7	N	RAINY SEASON
175	1121573	N	N	N/N/N/N	13.2	4.7	236	21	14	0.47	12	0.39	Y	5	2	2	1	0	1.3	2	1	10	1	10	25	1	2	2.84	5	2	4.3	UPCR=0.1	FATIGUE OR OVEREXERTION, WINTERS
176	1006101	N	Y	N/N/N/N	12.6	7.8	221	25	18	0.8	16	NA	Y	7	4	3	4	1	2.7	3	4	40	1.5	15	30	0	1	2.78	6.5	3.8	9.7	N	N
177	908780	N	N	N/N/N/N	11.7	7.8	249	18	19	0.93	49	24.7	Y	6	5	8	5	0	2	5.5	5	50	2	20	5	3	2	4.79	12	4.8	12.5	N	RAINY SEASON
178	635707	N	N	N/N/N/N	11.4	6.9	214	39	36	0.62	9	NA	Y	5	2	3	2	0	1	3	2	20	1	10	5	3	1	3.07	7	2.4	6	N	FATIGUE OR OVEREXERTION
179	463423	N	N	N/N/N/N	11.9	6.56	214	49	49	0.55	28	NA	Y	4	1	2	3	0	1	4	3	30	1	10	10	1	0	3.31	5	2	8	N	COLD FOOD, RAINY SEASON
180	827300	Y	Y	N/N/N/N	9.8	6.6	238	32	28	0.63	54	NA	Y	8	7	8	6	1	2.7	7.5	6	60	6	60	40	2	5	5.05	19	6	16.2	N	N
181	916390	Y	N	N/N/N/N	10.2	7.9	345	10	13	0.14	40	28.8	Y	9	6	6	7	2	6	6	6	60	3	30	120	4	6	5.23	19	6	18	ANA IF WITH TITTE 1:160 HOMOGENOUS	N
182	1165718	Y	N	N/N/N/N	9	7.9	259	18	14	1.1	90	NA	Y	9	8	8	8	2	4.3	8	8.5	85	7	70	60	4	6	6.15	25.5	7	20.8	HBA1c= 7.7	N
183	1165620	Y	Y	N/N/N/N	10.1	7.4	294	34	33	0.7	40	NA	Y	5	4	4	3	1	1.7	4	3	30	3	30	25	2	0	3.79	8	3.4	8.7	N	N
184	1175514	N	N	N/N/N/N	11	6.3	231	16	35	0.77	38	NA	Y	7	6	5	5	0	1	6	4	40	4	40	60	3	2	4.47	13	4.6	11	N	N
185	1176406	N	N	N/N/N/N	12.6	11.2	166	19	17	0.56	31	NA	Y	9	6	8	6	0	1.3	7	6	60	3.5	35	15	0	2	3.64	11.5	5.8	14.3	VIT D= 8.16, URIC ACID=6.9	N
186	1178484	N	N	N/N/N/N	11.5	6.6	321	30	31	0.74	66	NA	Y	6	7	8	8	2	2	7	8	80	6	60	110	4	5	5.80	23	6.2	17	N	N
187	1162962	N	Y	N/N/N/N	11	10.6	273	18	22	0.91	64	NA	Y	9	7	8	8	2	4	8	8	80	8	80	120	5	8	6.08	29	6.8	20	N	N
188	1023145	N	Y	N/N/N/N	10.2	5.4	266	32	30	0.69	36	NA	Y	7	5	5	6	1	2	5.5	6	60	4	40	50	0	3	3.83	13	4.8	13.5	N	N
189	688356	Y	N	N/N/N/N	11	9.11	167	28	23	0.97	40	NA	Y	5	4	3	3	0	1	4	3	30	3	30	50	2	0	3.79	8	3	8	N	N
190	1181236	N	N	N/N/N/N	10.8	8.9	233	26	32	0.59	69	NA	Y	9	9	10	7	1	3.7	10	7.5	75	6	60	30	4	6	5.82	23.5	7.2	21.2	N	N
191	1181209	Y	N	N/N/N/N	10.4	6.6	287	16	18	0.63	51	NA	Y	6	7	6	5	1	3.7	6	6	60	5	50	30	3	6	5.25	20	5	15.7	N	N
192	1124936	N	N	N/N/N/N	11.7	10.5	279	21	21	0.55	45	NA	Y	6	8	6	6	0	2	6	5.5	55	6.5	65	20	3	9	5.24	24	5.2	13.5	N	N
193	926074	N	N	N/N/N/N	10.9	5.7	281	27	31	0.64	42	NA	Y	5	6	4	3	0	0.7	4	3	30	3	30	20	2	2	4.22	10	3.6	7.7	N	N
194	1126936	N	N	N/N/N/N	10.6	7.1	266	20	14	0.71	32	NA	Y	7	4	5	4	0	0.7	4	3	30	2	20	20	2	0	3.64	7	4	7.7	N	N
195	1144649	Y	N	N/N/N/N	10.2	6.6	169	23	22	0.84	42	NA	Y	5	6	7	6	1	1.7	6	7	70	5	50	50	4	2	5.11	18	5	14.7	N	N
196	661518	N	N	N/N/N/N	11	8.6	296	16	12	0.78	30	NA	Y	6	3	2	1	0	1.7	2	2	20	2	20	20	2	0	3.45	6	2.4	5.7	N	N
197	1130324	N	N	N/N/N/N	10.9	4.9	271	27	35	0.66	62	NA	Y	5	7	9	8	1	8	10	9	90	6	60	30	7	11	6.56	33	6	27	N	N
198	189602	N	N	N/N/N/N	14	8	287	20	23	0.61	32	NA	Y	5	0	0	2	0	2.3	0.5	1	10	1	10	15	0	0	2.57	2	1.4	3.8	N	N
199	1185732	Y	Y	N/N/N/N	10.8	7.5	258	25	20	0.91	22	NA	Y	4	0	1	1	0	0	0.5	1	10	0	0	0	0	0	2.30	1	1.2	1.5	N	N
200	584867	N	N	N/N/N/N	12.1	4	222	18	20	0.5	23	7.62	Y	4	3	2	1	0	1	3	1	10	1	10	10	5	2	3.98	9	2	5	N	WINTERS

Baba Farid University
of Health Sciences
Sadiq Road
Faridkot-151 203 (Pb). INDIA.
Phone : 01639 256232,256236
Tele/Fax : 01639-256235
Email – Examination@bfuhs.ac.in

No. BFUHS/2K21p-TH/ 5021

Date 20/1/2021

The Principal,
DMC,Ludhiana

Subject: **Approval of Plan of Thesis.**

This is to inform you that the Faculty of Medical Sciences in its meeting held on 22.01.2021 has approved the plan of thesis of **Dr. Ravreet Pal Kaur**, a student of your college for **MD General Medicine** along with the names of Supervisor/Co-Supervisor as under:-

Topic Plan of Thesis
Comparison of various disease activity indices in rheumatoid arthritis

Supervisor
Dr. Sandeep Puri
Prof.,
Dept. of Medicine,
DMCH, Ludhiana.

Co-Supervisor
Dr.vipin Kumar,
Asstt Prof,
Dept of Medicine.
,
Dept. of Rheumatology,
DMCH, Ludhiana.

The student has to submit the three copies of thesis (along with PDF format) , to the Controller of Examinations, BFUHS, Faridkot, at least six months before the commencement of theory examination, if he/she is otherwise eligible to take the examination. He /She must directed to attach a photocopy of this letter with the forwarding letter while submitting thesis to the University along with the letter of approval of University for change of supervisor/Co-Supervisor, change of topic,(if any).

S P Singh

Dr. S P Singh MS(Oph)
Controller of Examinations

Note :

1. ***If any discrepancy found regarding topic of thesis or Supervisor/Co-Supervisor, inform undersigned within one month after issue of this letter.***
2. *The student may submit the thesis as per the schedule already conveyed i.e for May/June examination 30th Nov of the preceding the year of examination and for Nov/Dec examinations 31st May of the year of examination.*

COMPARISON OF VARIOUS DISEASE ACTIVITY INDICES IN RHEUMATOID ARTHRITIS

THESIS PROPOSAL

FOR APPROVAL OF SUBJECT OF THESIS TO BE SUBMITTED
IN PARTIAL FULFILMENT OF THE REQUIREMENTS

FOR THE DEGREE OF

DOCTOR OF MEDICINE

IN

MEDICINE

OF THE

BABA FARID UNIVERSITY OF HEALTH SCIENCES
FARIDKOT

NOVEMBER, 2019

DR. RAVREET PAL KAUR

DEPARTMENT OF MEDICINE
DAYANAND MEDICAL COLLEGE & HOSPITAL
LUDHIANA

ABSTRACT OF PLAN OF THESIS

Title	COMPARISON OF VARIOUS DISEASE ACTIVITY INDICES IN RHEUMATOID ARTHRITIS
For the degree of	M.D. (Medicine)
Name of the candidate	Dr. Ravreet Pal Kaur
Supervisor	Dr. Sandeep Puri, Professor, Department of Medicine, DMCH, Ludhiana
Co-supervisor(s)	Dr. Vikas Gupta, Assistant Professor, Department of Rheumatology, DMCH, Ludhiana
Institution	Dayanand Medical College and Hospital, Ludhiana
University	Baba Farid University of Health Sciences, Faridkot

Introduction: Rheumatoid arthritis is a chronic inflammatory autoimmune disease which is highly prevalent worldwide. Over the past many years the disease activity was assessed using DAS 28 and CDAI. Various new indices have been developed in order to assess the disease activity of Rheumatoid arthritis, like RADAI-5 and RAPID-3. But these indices have not yet been widely used or studied.

Aim of Study: To study the correlation and agreement of RAPID 3 and RADAI 5 (disease activity indices based on patient reported outcomes) with DAS 28 and CDAI (conventional disease activity indices based upon formal joint count and assessed by the clinician)

Materials & Methods: A prospective study would be carried out amongst the patients attending Medicine and Rheumatology OPD of DMC&H. 200 patients would be enrolled in the study. Quetionnaires for RAPID 3 and RADAI 5 will be used to calculate these respective scores. Clinician would be explaining the questions in punjabi, as need be. RADAI 5 will be used after validation in Punjabi language. Any investigations or records available with the patient would also be used like ESR. Clinician based calculation of DAS 28 score and CDAI score would be done for the same set of patients. Spearman correlation coefficient and kappa coefficient would be used to evaluate the statistical correlation between RAPID 3, RADAI5 and DAS28, CADAI.

Clinical Significance: The RAPID 3 and RADAI 5 questionnaires are based upon patient reported outcomes rather than the clinician assessing the disease activity in the patient on each follow up using CDAI and DAS 28. If RAPID 3 and RADAI 5 are found to co-relate with the conventional disease activity indices, they can be of great benefit , especially in resource limited settings and overburdened health care infrastructure, as these are quick to administer and require minimal investigations. Also since these are patient based scores, they can be self administered time to time and hence help the patient recognize any flare and seek physician's advice early.

Keywords: RAPID 3, RADAI 5, RHEUMATOID ARTHRITIS.

Ravreet Pal Kaur

(Signature)	(Signature)	(Signature)	(Signature)
Candidate	Co-supervisor	Supervisor	Principal

CERTIFICATE OF FACILITIES AVAILABLE

This is to certify that the facilities for work on the subject of thesis entitled **"COMPARISON OF VARIOUS DISEASE ACTIVITY INDICES IN RHEUMATOID ARTHRITIS"** exist in the Department of Medicine, Dayanand Medical College & Hospital, Ludhiana and will be provided to the candidate. We will see that the data being included in the thesis are genuine and is collected by the candidate himself under our supervision and guidance.

Supervisor

Dr. Sandeep Puri
Principal and Professor
Department of Medicine
DMCH, Ludhiana

Co-Supervisor(s)

Dr. Vikas Gupta
Assistant Professor
Department of Rheumatology
DMCH, Ludhiana

Head of the Department

Dr. Dinesh Gupta
Professor and Head
Department of Medicine
DMCH, Ludhiana

Place : _____

Date : _____

APPROVAL PROFORMA
BY
RESEARCH & ETHICAL COMMITTEE
DAYANAND MEDICAL COLLEGE & HOSPITAL, LUDHIANA

Name of candidate	Dr. RAVREET PAL KAUR
Department	Medicine
Topic of Thesis	COMPARISON OF VARIOUS DISEASE ACTIVITY INDICES IN RHEUMATOID ARTHRITIS
Likely date of appearing in PG examination	MAY-JUNE 2022
Date of enrollment	6 MAY, 2019
Name of Head of Department	Dr. Dinesh Gupta
1) Supervisor **2) Co-Supervisor(s)**	Dr. Sandeep Puri Dr. Vikas Gupta
Signature of Members of Research Committee with Stamp	**Signature of Members of Ethics Committee with Stamp**
Dr. Jaspal Singh (Professor & Head, Surgery)	Mr. A K Jindal (Member, Ethics Committee)
Dr. Dinesh Gupta (Professor & Head, Medicine)	Dr. Anu Sharma (Professor, Anatomy)
Dr. Sandeep Kaushal (Assistant Dean Academics)	Dr. Deepinder K Chhina (Professor & Head, Microbiology)
Dr. Rajoo Singh Chhina (Dean Academics)	Dr. Neena Sood (Professor & Head, Pathology)
Dr. Gurpreet S Wander (Vice Principal)	Dr. Gurpreet S Wander (Vice Principal)
	Dr. Gagandeep Singh (Secretary, Ethics Committee Professor & Head, Neurology)

Approved: Yes / ~~No~~

Dr. Sandeep Puri
Chairperson
Research Committee

Chairperson
Research Committee

Approved: Yes / ~~No~~

Prof. Arvind Malhotra
Chairperson
Ethics Committee

Chairperson
Ethics Committee

BABA FARID UNIVERSITY OF HEALTH SCIENCES, FARIDKOT

PROFORMA FOR REGISTRATION OF SUBJECT FOR DISSERTATION

1	NAME OF THE CANDIDATE AND ADDRESS	Dr. Ravreet Pal Kaur Post- graduate Student, Department of Medicine, Dayanand Medical College and Hospital, Ludhiana
2	NAME OF THE INSTITUTE	Dayanand Medical College and Hospital
3	COURSE OF STUDY AND SUBJECT	DOCTOR OF MEDICINE IN GENERAL MEDICINE
4	DATE OF ADMISSION OF COURSE	06-05-2019
5	TITLE OF THE TOPIC	COMPARISON OF VARIOUS DISEASE ACTIVITY INDICES IN RHEUMATOID ARTHRITIS

6. BRIEF RESUME OF THE INTENDED WORK

6.1 NEED FOR THE STUDY

Rheumatoid Arthritis affects about 0.75% of adult population in India.[1]

Rheumatoid arthritis is a chronic inflammatory disease leading to various articular as well as extra-articular manifestations, and can lead to sequelae like permanent joint damage and deformity , if not treated adequately and timely .Various blood investigations like Rheumatoid factor , serum antibodies against cyclic citrullinated peptides (anti-CCPs), C- reactive protein (CRP) and erythrocyte sedimentation rate (ESR) are used routinely for diagnosis and prognostication of Rheumatoid arthritis .

The natural course of Rheumatoid arthritis has exacerbations and remissions which are important to identify early as their early identification will help escalating or de-escalating the treatment and ultimately help in preventing permanent deformity and toxicity of DMARDs (disease modifying antirheumatic drugs) used in treatment of Rheumatoid arthritis

Regular and timely assessment of disease activity thus forms a cornerstone in appropriate treatment strategy for Rheumatoid arthritis.

Rheumatoid arthritis per say due to disease activity leads to joint tenderness, stiffening, limitation of movement and impairment in overall quality of life. Since these are subjective phenomenon, hence the patient himself/herself grading them on a likert scale can lead to an adequate assessment of disease activity.

RAPID 3 (Routine Assessment of Patient Index Data 3) and RADAI 5 (Rheumatoid Arthritis Disease Activity Index- 5) are relatively newer and less studied indices which are based on this concept.

The conventional scoring systems used to assess disease activity in Rheumatoid Arthritis like DAS28 (Disease Activity Score 28) and CDAI (Clinical Disease Activity Index) are based on formal joint count assessment done by the physician which is time consuming and not practical in a busy OPD, particularly in a country like India where the disease burden is high.

The newer disease activity indices like RADAI-5 and RAPID3 which include only patient reported outcome measures may be more practical in a resource limited setting as they do not involve doing a formal joint count.

Further these indices (RAPID 3 and RADAI 5) can help classify the disease activity as near remission, low severity, moderate severity & high severity, just as the conventional indices.

However, it is important to know if these indices yield similar information as provided by formal joint count based indices like DAS28 and CDAI.

Hence, we wish to study the correlation and agreement of RADAI-5 and RAPID3 indices with the joint count based indices DAS28 and CDAI .

If the correlation is good, these indices can be used for patient care in clinical practice to make treatment decisions.

If RAPID 3 and RADAI 5 are found to co-relate with the conventional disease activity indices, they can be of great benefit, especially in resource limited settings and overburdened health care infrastructure, as these are quick to administer and require minimal investigations.

Also since these are patient based scores, they can be self administered time to time and hence help the patient recognize any flare and seek physician's advice early.

The RAPID 3 and RADAI 5 scoring systems have not yet been studied in Indian Punjabi population.

Further, it can be evaluated that which one out of RAPID 3 and RADAI-5, has a stronger correlation with DAS 28 and CDAI.

Also RADAI 5 has not yet been validated in Punjabi language and validating this novel questionnaire of RADAI 5 in Punjabi language will be useful and appropriate for Indian Punjabi population as Punjabi is the native language of this subset of population and would be easily understood by all patients .

6.2 REVIEW OF LITERATURE

Rheumatoid arthritis is one of the common disease occurring globally [2] with a world wide prevalence of 1 % and prevalence of 0.75% in India.[1]

The degree of disease activity needs to be assessed in order to measure elements of patient's suffering, to obtain a picture of fluctuating course of the disease, for time to time monitoring and to make decisions with regard to treatment[3] and to assess adequate response to treatment .Various indices have been used to measure the disease activity. The two most commonly used indices being DAS 28 (ESR or CRP based) &CDAI, which are accepted worldwide for measuring the disease activity.[4]

Recently, there has been increased emphasis on measurement of disease activity as assessed directly from the patient, without interpretation from the physician i.e. Patient Reported Outcomes (PROs).[5]

ACR has included 3 Patient reported outcomes in the ACR RA Core data set –namely 'Physical function' , 'Pain' and 'Global assessment of disease activity'.[6]

There has been emphasis from multiple groups to integrate outcomes that reflect the symptoms and life impact of disease of most relevance to patients as endpoints in clinical trials and as part of standard clinical assessment in practice.[7-10]

The treat to target approach is thought to result in better outcome for the patients and based upon this principle is the context that RA therapy should be based on a shared decision between patient and rheumatologist.[11]

Hence, there has been development of various Indices based upon PROs, globally to measure the disease activity, fatigue, disease impact and pain: [5,12]

- Indices developed to measure Disease Activity :

  RAPID 3

  RAPID 5

RADAI 5

DASH

QuickDASH

PRO-CLARA

- Indices developed to measure fatigue:

  BRAF

  FACIT-F

- Indices developed to measure pain :

  RAPS

  PAIN VAS

- Indices developed to measure Disease Impact :

  RAID

These are the newer indices and have not yet been evaluated/ studied globally when compared to the conventional disease activity indices of rheumatoid arthritis like DAS 28 and CDAI.

Even amongst the conventional indices used Salaffi F, et al[13] concluded that DAS 28 has low specificity for remission and low disease activity than CDAIin a cross sectional study conducted amongst 2864 RA patients.

RAPID 3 and its correlation to DAS 28 &CDAIhas been studied in India by Harpreet Singh, Vikas Gupta, et. al:[14] and have concluded that RAPID 3 correlates very well with DAS 28 and CDAI with spearman coefficient value of 0.910 ($p<0.001$) and 0.907 ($p<0.001$) respectively. Also there was correlation b/w classification of severity according to RAPID3 when compared to classification by DAS 28 and CDAI, with a higher degree of correlation in classification with DAS 28 than with CDAI, with the agreement being higher in category of moderate – severe disease.

Das AK, et al in a study amongst 105 adult literate persons found out the usefulness of RAPID 3 both in measuring quantitative disease activity as well as monitoring of treatment response on follow up visits. Also this was found helpful in improving care providence and enhance documentation.[4]

RADAI 5 was studied by H. Singh, et al[15] and concluded that RADAI 5 was significantly correlated with DAS28 and CDAI with spearman coefficient value of 0.862 ($p<0.001$) and 0.856 ($p<0.001$) respectively. Also there was correlation b/w classification of severity according to RADAI 5 when compared to classification by DAS 28 and CDAI, with a higher degree of correlation in classification with DAS 28 than with CDAI, with the agreement being higher in category of moderate – high disease.

B.F. Leeb, P.M. Haindl, et al:[16] studied about RADAI 5 to monitor rheumatoid arthritis and concluded that changes of RADAI 5, the DAS 28-ESR and CDAI were significantly correlated , indicating the instrument' s sensitivity to change in a first study conducted on 169 Rheumatoid Arthritis patients. Also thresholds for disease activity categorieswas established in a second study on 392 Rheumatoid Arthritis patient. They also concluded that a stable remission according to RADAI 5 holds a different meaning than remission according to DAS 28 or CDAI, as the RADAI 5 questionnaire includes time factor and thus a remission according to RADAI 5 scoring cannot be expected after a short period of time.

ShereenRKet al[17] in a study on 40 patients concluded that RADAI 5 was significantly correlated with DAS 28 with pearson coefficient value of 0.9 and $p<0.001$, Also it was found that RADAI 5 was significantly correlated with quality of life scale, pain scale(100 mm visual analog pain scale), and functional status. Also RADAI 5 was found to be significantly correlated with morning stiffness duration.

Pincus T, et al[18] concluded that RAPID 3 can be scored in 5 to 10 seconds as compared to 108 seconds for CDAI and 114 seconds for DAS 28. They also classified disease severity based upon RAPID 3 score as follows

- score of > 12 = high; 6.1- 12 = moderate; 3.1-6 = low; < / = 3 s/o remission. They also found significant correlation between RAPID 3 and CDAI.

In another study by T. Pincus, et al.[19] concluded that RAPID 3 score

were correlated significantly with DAS 28 and CDAI with rho value >0.65 at p<0.001. Also they proposed RAPID 3 classification of disease activity as follows-- > 4= high; 2.01- 4 = moderate; 1.01-2 = low; </= 1 s/o near remission and were comparable to DAS 28 categories of high (> 5.1), moderate (3.21-5.1), low (2.61- 3.2), and remission (</= 2.6) & comparable to CDAI categories of >22, 10.1-22.0 , 2.9- 10.0 , and </= 2.8 respectively.

In a study of 100 newly diagnosed patients of rheumatoid arthritis in south India by B. Siddhartha Kumar ,et al[20], a significant positive correlation was observed between DAS28 and RAPID3 with r= 0.404; P<0.001 , though the agreement between DAS28 and RAPID3 were relatively less robust in this study with kappa statistic being= 0.072 .

Gaps in current knowledge and areas of limitation:

Reason of higher degree of correlation b/w RADAI 5, RAPID 3 with DAS 28 CDAI classification of disease activity as the severity of disease increases.

A stable remission according to RADAI 5 holds a different meaning than remission according to DAS 28 or CDAI, as the RADAI 5 questionnaire includes time factor and thus a remission according to RADAI 5 scoring cannot be expected after a short period of time.

Conflict of interest:

None

6.3 AIMS AND OBJECTIVES OF THE STUDY

- To study the correlation and concordance of RAPID3 and RADAI-5 with DAS28 and CDAI
- To validate RADAI-5 in Punjabi language for use in Indian Punjabi population.

7. MATERIALS AND METHODS

- TYPE OF STUDY – Prospective
- POPULATION - Patients attending Medicine and Rheumatology OPD who fulfill the 2010 ACR/EULAR classification criteria for Rheumatoid Arthritis
- 200 patients of Rheumatoid Arthritis visiting Medicine and Rheumatology OPD at DMCH, Ludhiana will be included.
- MATERIAL- Questionnaires of 'RADAI-5' and 'RAPID3'
- Calculation of RADAI-5 and RAPID 3 scores based upon questionnaires
- Calculation of DAS 28 and CDAI scores
  - DAS28 = 0.56 √TJC + 0.28 √SJC + 0.70(log ESR) + 0.014(GH)
  - CDAI = TJC + SJC + PGA + EGA

7.1 Source of Data

Patients visiting medicine and rheumatology opd atDMCH, Ludhiana.

Any investigations available with them.

Proforma, which would include calculation of all above mentioned scores.

7.2 METHOD OF COLLECTION OF DATA

Via Questionnaire (for self filling or narrated in Punjabi) for RADAI-5 and RAPID 3 calculationand viaOPD based assessment of patient for the number of tender and swollen joint count for DAS28 and CDAI calculation

- **Inclusion Criteria**:
  - Patients aged 18 years and above who give consent to participate in this study.
  - Fulfilling 2010 ACR/EULAR classification criteria criteria for Rheumatoid Arthritis.
- **Exclusion Criteria**: Patients who are severely anemic (Hb< 7gm/dl), having pre-existing renal, cardiac, liver or pulmonary disease.

OUTCOME

Outcome will be studied in terms of level of agreement between RAPID 3 and RADAI 5 in comparison to DAS28 and CDAI.

If a significant correlation is established between RAPID 3 /RADAI 5 and DAS28 /CDAI, these newer indices based upon patient reported outcomes can be used for a quick assessment of the disease activity, hence will ultimately be helpful to decide about next best treatment plan.

STATISTICAL ANALYSIS

Spearman correlation coefficient statistics will be used to study the correlation and agreement between the different disease activity indices. A probability value (*p* value) of less than 0.05 will be considered statistically significant . Statistical calculations will be done using SPSS (Statistical Package for the Social Sciene) SPSS 21 version statistical program for Microsoft Windows.

Cronbach's alpha will be used to validate the Punjabi version of RADAI5.

7.3 DOES THE STUDY REQUIRE ANY INVESTIGATIONS OR INTERVENTIONS TO BE CONDUCTED ON PATIENTS OR OTHER HUMANS OR ANIMALS? IF SO, PLEASE DESCRIBE BRIEFLY.

No. It only requires investigations required in routine management of the patient like ESR.

.7.4 HAS ETHICAL CLEARANCE BEEN OBTAINED FROM YOUR INSTITUTION IN CASE OF 7.3?

Attached herewith

8. LIST OF REFERENCES

1. Malaviya AN, KapoorSK,SinghRR,Kumar A, Pande I.Prevalence of rheumatoid arthritis in the adult Indian population.Rheumatol Int.1993;13:131-4.
2. Cross M , Smith E , Hoy D , Carmona L, Wolfe F , Vos T, Williams B, et al.The global burden of rheumatoid arthritis: estimates from the global burden of disease 2010 study.Ann Rheum Dis. 2014;73:1316-22.
3. Salaffi F, Ciapetti A. Clinical disease activity assessments in rheumatoid arthritis.Int. J. Clin. Rheumatol. 2013;8:347-60
4. Das AK, Sarkar RN, Das CK, Baisya R, Bhattacharjee U, Biswas P, et al. A comparison of 3 rheumatoid arthritis disease activity indices in routine clinical practice. Indian J Rheumatol.2017;12:209-13.
5. Orbai AM, Bingham CO. Patient reported outcomes in rheumatoid arthritis clinical trials. CurrRheumatol Rep. 2015;17:28.
6. Pincus T. The American College of Rheumatology (ACR) Core Data Set and derivative "patient only" indices to assess rheumatoid arthritis.ClinExpRheumatol. 2005;23:S109-13.
7. Boers M, Kirwan JR, Wells G, Beaton D, Gossec L, d'Agostino MA et al. Developing core outcome measurement sets for clinical trials: OMERACT filter 2.0. JClinEpidemiol. 2014;67:745-53.
8. Tugwell PS, Petersson IF, Boers M, Gossec L, Kirwan JR, Rader T et al. Domains selection for patient-reported outcomes: current activities and options for future methods. J Rheumatol. 2011;38:1702-10.
9. Frank L, Forsythe L, Ellis L, Schrandt S, Sheridan S, Gerson J, et al. Conceptual and practical foundations of patient engagement in research at the patient-centered outcomes research institute. Qual Life Res. 2015;24:1033-41.
10. Frank L, Basch E, Selby JV. The PCORI perspective on patient-centered outcomes research. JAMA. 2014;312:1513-4.
11. Smolen JS, Aletaha D, Bijlsma JW, Breedveld FC, Boumpas D, Burmester G, et al. Treating rheumatoid arthritis to target:

recommendations of an international task force. Ann Rheum Dis. 2010;69:631-7.

12. U.S. National library of Medicine. Current Adoption of Composite Indices in Evaluating Rheumatoid Arthritis Patients: An Observational Study (New Indices). Feb 4, 2013.
13. Salaffi F, Cimmino MA, Leardini G, Gasparini S, Grassi W. Disease activity assessment of rheumatoid arthritis in daily practice: Validity, internal consistency, reliability and congruency of the Disease Activity Score including 28 joints (DAS28) compared with the Clinical Disease Activity Index (CDAI). Clin Exp Rheumatol. 2009;27:552-9.
14. Singh V,Gupta V, Ray S, Kumar H, Talapatra P, Kaur M, et al. Evaluation of disease activity in rheumatoid arthritis by Routine Assessment of Patient Index Dats 3 (RAPID3) and its correlation to Disease Activity Score 28 (DAS28) and Clinical Disease Activity Index (CDAI): an Indian experience. ClinRheumatol.2012;31:1663-9.
15. Singh H,TanwarVS, Sukhija G, Mathur R, Kaur P. Rheumatoid Arthritis Disease Activity Index-5:Utility in Busy Clinical Settings. Indian Journal of Rheumatology.2018;22:72-5
16. Leeb BF, Haindl PM, Brezinschek HP, Nothnagl T, Rintelen B. RADAI-5 to monitor rheumatoid arthritis: ClinExpRheumatol. 2014;32:S55-8.
17. Kamel SR. Using Rheumatoid Arthritis Disease Activity Index-5 questionnaire in the assessment of disease activity in patients with rheumatoid arthritis: correlation with quality of life, pain, and functional status. Egypt Rheumatol Rehabil. 2018;45:43-8
18. Pincus T, Yazici Y, Bergman MJ. Patient questionnaires in rheumatoid arthritis: advantages and limitations as a quantitative, standardized scientific medical history. Rheum Dis Clin North Am. 2009;35:735-43.
19. PincusT, Swearingen CJ, Bergman M, Yazici Y. GRAPID3 (Routine Assessment of Patient Index Data 3), a Rheumatoid Arthritis Index Without Formal Joint Counts for Routine Care: Proposed Severity

Categories Compared to Disease Activity Score and Clinical Disease Activity Index Categories. The journal of Rheumatology. 2008;35:2136-47.

20. Kumar BS, Suneetha P, Mohan A, Kumar P, SarmaKVS. Comparison of Disease Activity Score in 28 joints with ESR (DAS28), Clinical Disease Activity Index (CDAI), Health Assessment Questionnaire Disability Index (HAQ-DI) & Routine Assessment of Patient Index Data with 3 measures (RAPID3) for assessing disease activity in patients with rheumatoid arthritis at initial presentation. Indian J Med Res. 2017;146:S57-62.

PROFORMA

Name _____ Age _____

Gender _____ Study No _____ MRD No. _____

Identification Mark : _____

Address _____

_____

Date of inclusion _____

Duration of disease _____

Phone number _____

Education : _____

Occupation _____

Consent: Yes / No

Smoker: Yes / No

Any other co-morbidity : DM / HTN / TB / Others _____

Any pre-existing renal / cardiac / hepatic / pulmonary disease : _____

Any other autoimmune disease : _____

Autoantibody: RF _____

Anti CCP _____

Any history of Rheumatoid arthritis in the family : Yes / No

Any identified cause of flare as per patient (if applicable) :

Not identified / Stress / Infection / Fatigue or overexertion / Others

_____

Erosions: Yes / No / cannot be assessed

Signature of Candidate **Signature of Supervisor**

Extra articular features (encircle which ever is present) :

Nodules	ILD	SS
Neuropathy	Vasculitis	Skin

Others _____

_____

First visit / Follow up

GENERAL PHYSICAL EXAMINATION	
BP	
Height	
Weight	
BMI	
Pulse Rate	
Pallor	
Deformity (Y/N)	
Icterus / Cyanosis / Edema / Clubbing	
INVESTIGATION	
Hb	
TLC	
Platelet count	
AST	
ALT	
S. Creatinine	
ESR	
CRP (Optional)	
Any other investigation if available	

Signature of Candidate **Signature of Supervisor**

Fullfilling the 2010 ACR/EULAR classification criteria of RA : Y / N

	SCORE	PATIENT'S SCORE
A. Joint involvement		
○ 1 large joint (Shoulder/Elbow/Knee/Ankle)	0	
○ 2-10 large joints	1	
○ 1-3 small joints (large joints not counted)	2	
○ 4-10 small joints (large joints not counted)	3	
○ >10 joints (at least one small joint)	5	
B. Serology (at least 1 test)		
○ Negative RF and negative ACPA	0	
○ Low-positive RF or low-positive ACPA (≤3times)	2	
○ High-positive RF or high-positive ACPA (>3times)	3	
C. Acute-phase reactants (at least 1 test)		
○ Normal CRP and normal ESR	0	
○ Abnormal CRP or abnormal ESR	1	
D. Duration of symptoms		
○ <6 weeks	0	
○ ≥6 weeks	1	

Total Score = _____

iii

Signature of Candidate **Signature of Supervisor**

ਆਰ ਏ ਡੀ ਏ ਆਈ – 5 ਪ੍ਰਸ਼ਨਾਵਲੀ

1. ਪਿਛਲੇ ਛੇ ਮਹੀਨਿਆਂ ਵਿੱਚ ਆਪ ਦਾ ਗਠੀਆ ਕਿੰਨਾ ਗੰਭੀਰ ਸੀ?

ਬਿਲਕੁਲ ਗੰਭੀਰ ਨਹੀਂ ਸੀ | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | ਬਹੁਤ ਗੰਭੀਰ ਸੀ

2. ਜੋੜਾਂ ਦੇ ਹੱਥ ਲਾਉਣ ਨਾਲ ਦੁਖਣ ਅਤੇ ਸੋ ਜਿਸਦੇ ਹਿਸਾਬ ਨਾਲ ਅੱਜ ਆਪ ਦੇ ਗਠੀਏ ਦੀ ਕਿੰਨੀ ਤਕਲੀਫ ਹੈ?

ਬਿਲਕੁਲ ਤਕਲੀਫ ਨਹੀਂ ਹੈ | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | ਬਹੁਤ ਜ਼ਿਆਦਾ ਦਰਦ ਅਤੇ ਸੋਜਿਸ਼ ਹੈ

3. ਅੱਜ ਤੁਹਾਡੇ ਜੋੜਾਂ ਦਾ ਦਰਦ ਕਿੰਨਾ ਜ਼ਿਆਦਾ ਹੈ?

ਕੋਈ ਦਰਦ ਨਹੀਂ | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | ਨਾ ਸਹਿਣ ਯੋਗ ਦਰਦ

4. ਅੱਜ ਤੁਹਾਡੀ ਸਿਹਤ ਕਿਸ ਤਰ੍ਹਾਂ ਦੀ ਹੈ?

ਬਹੁਤ ਵਧੀਆ | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | ਬਹੁਤ ਖਰਾਬ

5. ਕੀ ਤੁਸੀਂ ਕੱਲ ਸਵੇਰੇ ਉਠਣ ਸਮੇਂ ਹੱਥਾਂ ਦੇ ਜੋੜਾਂ ਵਿੱਚ ਅਕੜਾਅ ਮਹਿਸੂਸ ਕੀਤਾ ਸੀ ? ਜੇ ਮਹਿਸੂਸ ਕੀਤਾ ਸੀ, ਤਾਂ ਇਹ ਅਕੜਾ ਅਕਿਤਨਾ ਸਮਾਂ ਰਿਹਾ ਸੀ?

ਕੋਈ ਅਕੜਾਅ ਨਹੀਂ | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | ਸਾਰਾ ਦਿਨ ਅਕੜਾਅ ਰਿਹਾ

Signature of Candidate **Signature of Supervisor**

ROUTINE ASSESSMENT OF PATIENT INDEX DATA (RAPID-3)

1. PLEASE CHECK THE **ONE** BEST ANSWER FOR YOUR ABILITIES AT THIS TIME

OVER THE LAST WEEK WERE YOU ABLE TO	WITHOUT ANY DIFFICULTY	WITH SOME DIFFICULTY	WITH MUCH DIFFICULTY	UNABLE TO DO
a. Dress yourself, including tying shoelaces and doing buttons?	0	1	2	3
b. Get in and out of bed?	0	1	2	3
c. Lift a full cup or glass to your mouth?	0	1	2	3
d. Walk outdoors on flat ground?	0	1	2	3
e. Wash and dry your entire body?	0	1	2	3
f. Bend down to pick up clothing from the floor?	0	1	2	3
g.Turn regular faucets on and off ?	0	1	2	3
h.Get in and out of a car, bus, train, or airplane?	0	1	2	3
i. Walk two miles or three kilometers, if you wish?	0	1	2	3
j. Participate in recreational activities and sports as you would like, if you wish?	0	1	2	3

2. HOW MUCH PAIN HAVE YOU HAD BECAUSE OF YOUR CONDITION **OVER THE PAST WEEK?** PLEASE INDICATE BELOW HOW SEVERE YOUR PAIN HAS BEEN:

NO PAIN ○○○○○○○○○○○○○○○○○○○○○ PAIN AS BAD AS IT COULD BE

0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10

3. CONSIDERING ALL THE WAYS IN WHICH ILLNESS AND HEALTH CONDITIONS MAY AFFECT YOU AT THIS TIME, PLEASE INDICATE BELOW HOW YOU ARE DOING:

VERY WELL ○○○○○○○○○○○○○○○○○○○○○ VERY POORLY

0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10

v

Signature of Candidate **Signature of Supervisor**

PARAMETER	FINDINGS
EMS (mins) :	

Patient GA / PGA (0-10) :

VERY WELL ○○○○○○○○○○○○○○○○○○○○○ VERY POOR

0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10

Evaluator GA / EGA (0-10) :

VERY WELL ○○○○○○○○○○○○○○○○○○○○○ VERY POOR

0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10

Patient' s assessment of GLOBAL HEALTH / GH (0- 100) :

Best — Worst

0 10 20 30 40 50 60 70 80 90 100

mm mm

JOINT EXAMINATION	RIGHT			LEFT		
	T	S	L	T	S	L
PIP 1st						
PIP 2nd						
PIP 3rd						
PIP 4th						
PIP 5th						
MCP 1st						
MCP 2nd						
MCP 3rd						
MCP 4th						
MCP 5th						
Wrist						
Elbow						
Shoulder						
Knee						
TOTAL	28 SJC =			28 TJC =		

Signature of Candidate **Signature of Supervisor**

DISEASE ACTIVITY INDEX	SCORE
DAS 28 $0.56\sqrt{TJC}+0.28\sqrt{SJC}+0.70(\log ESR)+0.014(GH)$	
CDAI TJC+ SJC + PGA + EGA	
RADAI 5 (Q1 +Q2+ Q3 + Q4 + Q5) / 5	
RAPID 3 FN(reduced to a score of 0-10) + PN + PATGL	

Signature of Candidate **Signature of Supervisor**

RADAI-5

How active was your arthritis the last six months?

completely inactive | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | extremely active

How active is your arthritis today with respect to joint tenderness and swelling?

completely inactive | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | extremely active

How severe is your arthritis pain today?

no pain | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | unbearable pain

How would you describe your general health today?

excellent | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | extremely bad

Did you experience joint (hand) stiffness on awaking yesterday morning?
If yes, how long was this stiffness?

no stiffness | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | stiffness the whole day

Signature of Candidate **Signature of Supervisor**

ਮਰੀਜ਼ ਰਜ਼ਾਮੰਦੀ ਫਾਰਮ

ਮਿਤੀ _____

ਮੈਂ _____ਪਤਨੀ/ ਪੁੱਤਰ/ ਪੁੱਤਰੀ_____

ਵਾਸੀ _____

"COMPARISON OF VARIOUS DISEASE ACTIVITY INDICES IN RHEUMATOID ARTHRITIS" ਤੇ ਚੱਲ ਰਹੀ ਖੋਜ ਵਿੱਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਰਜ਼ਾਮੰਦ ਹਾਂ । ਇਸ ਖੋਜ ਕੰਮ ਵਿੱਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਮੈਂ ਆਪਣੀ ਮਰਜ਼ੀ ਨਾਲ ਤਿਆਰ ਹਾਂ ।ਮੈਂ ਇਹ ਦਸਣਾ ਚਾਹੁੰਦਾ ਹਾਂ/ ਚਾਹੁੰਦੀ ਹਾਂ ਕਿ ਇਹ ਰਜ਼ਾਮੰਦੀ ਦੇਣ ਵਾਸਤੇ ਮੈਨੂੰ ਕਿਸੇ ਵੀ ਤਰ੍ਹਾਂ ਦਾ ਲੋਭ-ਲਾਲਚ ਨਹੀਂ ਦਿੱਤਾ ਗਿਆ ਅਤੇ ਨਾ ਹੀ ਕੋਈ ਦਬਾਅ ਪਾਇਆ ਗਿਆ ਹੈ । ਮੈਂ ਇਹ ਪ੍ਰਸ਼ਨਾਵਲੀ ਆਪਣੀ ਸਮਝ ਨਾਲ ਭਰੀ ਹੈ ਅਤੇ ਕਿਸੇ ਤਰ੍ਹਾਂ ਦੇ ਦਬਾਅ ਜਾਂ ਸੁਝਾਅ ਨਾਲ ਨਹੀਂ । ਮੈਨੂੰ ਇਸ ਖੋਜ ਦਾ ਮਨੋਰਥ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂੰ ਇਹ ਭਰੋਸਾ ਦਿਵਾਇਆ ਗਿਆ ਹੈ ਕਿ ਇਹ ਖੋਜ ਵਿਗਿਆਨ ਅਤੇ ਮਾਨਵਤਾ ਦੀ ਭਲਾਈ ਲਈ ਹੈ।

ਮੈਂ ਇਸ ਖੋਜ ਕੰਮ ਵਿੱਚ ਹਿੱਸਾ ਲੈਣ ਬਾਰੇ ਆਪਣੀ ਰਜਾਮੰਦੀ ਕਿਸੇ ਵੀ ਸਮੇਂ ਵਾਪਸ ਲੈ ਸਕਦਾ ਹਾਂ / ਸਕਦੀ ਹਾਂ ਅਤੇ ਮੇਰੀ ਰਜ਼ਾਮੰਦੀ ਵਾਪਸ ਲੈਣ ਦਾ ਮੇਰੇ ਇਲਾਜ ਤੇ ਕੋਈ ਅਸਰ ਨਹੀਂ ਹੋਵੇਗਾ ।

_____ _____

ਗਵਾਹ ਦੇ ਹਸਤਾਖਰ ਮਰੀਜ਼ ਦੇ ਹਸਤਾਖਰ

ਨਾਮ ਨਾਮ

_____

ਨਿਰੀਖਕ ਦੇ ਹਸਤਾਖਰ

_____

ਸਿਖਿਆਰਥੀ ਦੇ ਹਸਤਾਖਰ

मरीज अनुमति फार्म

तिथि

मैं .....पत्नी/पुत्र/ पुत्री .....

निवासी .....

इस षोधकार्य "COMPARISON OF VARIOUS DISEASE ACTIVITY INDICES IN RHEUMATOID ARTHRITIS" में भाग लेने के लिए सहमत हूँ । मै इस षोधकार्य में भाग लेने के लिए अपनी स्वेच्छा से तैयार हूँ । मै पुष्टि करता / करती हूँ की यह स्वीकृति देने के लिए मुझे कोई आर्थिक प्रलोभन नहीं दिया गया और न ही दबाव डाला गया है । मुझे इस षोधकार्य का उद्देष्य स्पष्ट कर दिया गया है और मुझे यह विष्वास है कि यह विज्ञान और मानवता के लाभ के लिए है । मुझे इस षोधकार्य में होने वाले जोखिम के बाारे में समझा दिया गया है और मेरी समझ मे यह जोखिम बहुत मामुली है । यह प्रषनावली मैने अपनी समझ से भरी है किसी के दबाव और सुझाव से नही।

मै इस षोधकार्य में भाग लेने के सम्बन्ध में किसी भी समय अपनी अस्वीकृति व्यक्त कर सकता/ सकती हूँ और मेरे अस्वीकृति व्यक्त करने का मेरे इलाज पर कोई प्रभाव नहीं पडेगा ।

.....

ग्वाह के हस्ताक्षर

नाम :

.....

रोगी के हस्ताक्षर/अंगूठे का निषान

नाम :

अन्वेषक के हस्ताक्षर

विद्यार्थी के हस्ताक्षर

INFORMED PATIENT CONSENT

Date: _____

I.....D/o, W/o, S/o.....

Residence.....

.....

am willing to participate in the study **"COMPARISON OF VARIOUS DISEASE ACTIVITY INDICES IN RHEUMATOID ARTHRITIS"** The procedure with its complications has been explained to me in local vernacular language. I have fully understood that no special tests and extra expenditure in any form, merely for the purpose of thesis is being carried out. I am free to opt out the study any time without assigning any reason. I also state that I answered the questionnaires to the best of my knowledge and I have not been influenced by any of the questionnaire providers for any of my answers .

....

Signature of the Witness Signature of the patient

Name:

Signature of Candidate **Signature of Supervisor**

APPENDIX

Team involved in translation of RADAI-5 to Punjabi language:

Person 1 – Dr Ravreet pal kaur, PG Resident, DMCH

Person 2 - Mr Gurdeep singh, translator

Person 3 – Dr Sandeep Puri, Principal and Professor, Department of medicine, DMCH

Person 4 - Dr Vikas Gupta, Associate Professor, Depatment of rheumatology and immunology, DMCH

Person 5 – Dr Vipin Kumar, Associate Professor, Department of medicine, DMCH

Person 6 – Mrs Gurkamal kaur, retired HOD, Department of English, Guru Nanak Public School, Ludhiana

M: 9888126690

S. Gurdip Singh

Writer and Translator (English, Hindi and Punjabi)

302, Kidwai Nagar, Ludhiana (Punjab) 141008

E-mail: gurdipsingh302@gmail.com

CERTIFICATE OF FORWARD TRANSLATION

I hereby certify that I took part in forward translation process of RADAI 5 to Punjabi Language and produced one of the translation forms. Also after the review of the primary committee, I reviewed the selected punjabi translation of RADAI 5 and it is accurate to the best of my knowledge and satisfaction.

S. Gurdip Singh

Writer and Translator

S. GURDIP SINGH
Writer & Translator
302, Kidwai Nagar, LUDHIANA.

CERTIFICATE OF BACKWARD TRANSLATION

I hereby certify that I took part in backward translation process of Punjabi RADAI-5 to English language and produced one of the backward translation forms .Then I also compared the two backward translations in English to the original English version of RADAI-5. These were found to be similar and conceptually equivalent. It is accurate to the best of my knowledge and satisfaction.

Gurkamal Kaur

Mrs Gurkamal Kaur

Retired HOD, Dept of English

GNPS, Ludhiana

S.No.	MRD No	Name Initial	Age (years)	Gender	Date of inclusion	Duration of disease (years)	Education	Smoker	Other co-morbidity	Any other autoimmune disease	History of RA in family	If family history present which member	Erosions	RF	Value of RA Factor if available (IU/ml)	Anti CCP	Value of ANTICCP if available (IU/ml)	Nodules	ILD	SS
1	860511	HK	19	F	12-10-2019	2	12	N	N	N	N	N	-	P	NA	P	NA	N	N	N
2	506609	RK	29	F	12-10-2019	2	MA	N	N	N	Y	MOTHER	-	P	112	NA	NA	N	N	N
3	860418	PK	47	F	12-10-2019	0.25	UNEDUCATED	N	N	N	N	N	-	N	19.4	N	<7	N	N	N
4	843316	NK	34	F	12-10-2019	8	10	N	N	N	N	N	-	P	61.3	NA	NA	N	N	Y
5	561663	GS	42	M	14/12/19	1	8	N	Y HTN	ALLERGIC SKIN DISEASE	Y	MOTHER	-	P	42.21	P	8.84	Y	N	N
6	850610	RK	34	F	14/12/19	1	12	N	N	ALLERGIC SINUSITIS	N	N	-	P	>120	NA	NA	N	N	Y
7	242286	SK	72	F	14/12/19	44	5	N	N	N	Y	PATERNAL GRANDMOTHER	-	P	NA	NA	NA	N	N	Y
8	23303	K	18	F	17/12/2019	2	STUDYING IN 12	N	N	N	N	N	-	P	NA	NA	NA	N	N	Y
9	806805	MK	45	F	17/12/19	3	8	N	N	N	N	N	-	N	12.6	P	58.5	N	N	N
10	663542	KK	28	F	17/12/19	3	10	N	N	N	N	N	-	P	NA	NA	NA	N	N	Y
11	830970	PK	47	F	19/12/19	2	5	N	Y HTN	N	N	N	-	P	34	P	>200	N	N	Y
12	821594	R	52	F	19/12/19	10	7	N	Y HTN	ALLERGIC TO FQs	Y	N	-	P	NA	NA	NA	N	N	Y
13	484602	B	46	F	20/12/19	1.5	5	N	Y HTN	N	N	N	-	P	NA	NA	NA	N	N	N
14	839772	KD	67	F	21/12/19	10	UNEDUCATED	N	Y HTN	N	N	N	-	P	NA	P	NA	N	N	N
15	139101	MR	34	F	21/12/19	4	8	N	N	N	Y	MATERNAL UNCLE	-	P	21.5	P	470.9	N	N	N
16	870189	RK	57	F	21/12/19	1	UNEDUCATED	N	Y DM HTN	N	N	N	NA	N	NA	N	<7	N	N	P
17	857691	BK	40	F	21/12/19	7	UNEDUCATED	N	Y HTN	N	N	N	-	P	49	P	26.69	N	N	Y
18	850699	P	38	M	26/12/19	0.5	8	N	N	N	N	N	-	P	NA	NA	NA	N	N	N
19	406973	SK	37	F	27/12/19	15	10	N	N	N	Y	PATERNAL GRANDMOTHER	-	P	NA	P	500	N	N	N
20	765246	CK	51	F	28/12/19	1	5	N	N	N	N	N	-	P	NA	P	270	N	N	N
21	843316	NK	34	F	01-09-2020	8	10	N	N	N	N	N	-	P	61	NA	NA	Y	N	Y
22	51241	A	49	F	14/1/20	7	10	N	N	N	N	N	-	N	13.6	P	NA	N	N	N
23	885455	BK	50	F	23/1/20	1	5	N	Y HTN	Y HYPOTHYROID	N	N	-	N	NA	P	>500	N	N	Y
24	684831	LK	60	F	23/1/20	11	4	N	N	N	N	N	-	P	NA	NA	NA	N	Y	Y
25	835802	PK	48	F	23/1/20	19	8	N	N	N	N	N	-	N	NA	N	NA	N	N	Y
26	751612	HK	52	F	23/1/20	0.5	10	N	N	Y HYPOTHYROID	N	N	-	N	NA	N	<7	N	Y	Y
27	75761	KR	63	F	23/1/20	5	2	N	OA KNEE	N	N	N	-	N	NA	N	NA	N	N	N
28	880059	SK	45	F	24/1/20	1	5	N	ACUTE ON CHRONIC SDH	Y HYPOTHYROID	N	N	-	N	13.1	N	7	Y	N	Y
29	689146	SK	36	F	24/1/20	0.5	12	N	N	N	Y	SISTER	-	P	44	NA	NA	N	N	Y
30	510512	D	28	F	24/1/20	1.5	10	N	N	Y HYPOTHYROID	Y	MOTHER	-	P	NA	NA	NA	N	N	N
31	886804	VD	58	F	25/1/20	3	10	N	Y DM	N	N	N	-	P	131.3	NA	NA	Y	N	Y
32	886644	SK	69	F	25/1/20	3	MATRIC	N	N	Y CELIAC DISEASE	N	N	-	N	NA	N	NA	N	N	N
33	732611	HK	60	F	25/1/20	2	8	N	Y DM	Y HYPOTHYROID	N	N	-	P	NA	NA	NA	Y	N	N
34	865176	MB	65	F	25/1/20	0.5	UNEDUCATED	Y	Y DM	N	Y	N	-	P	123.5	P	>500	N	N	Y
35	127515	M	48	F	28/1/20	1	8	N	N	N	N	N	-	P	NA	NA	NA	N	N	Y
36	449710	HK	54	F	28/1/20	2	10	N	N	N	N	N	-	P	105.4	NA	NA	Y	N	Y
37	619168	RD	55	F	28/1/20	12	GRADUATION	N	N	N	N	N	-	P	NA	N	18.6	N	N	Y
38	787901	S	38	F	28/1/20	1	12	N	N	N	N	N	-	P	74	NA	NA	N	N	Y
39	710242	TS	69	M	30/1/20	3	UNEDUCATED	N	N	N	N	N	-	N	NA	P	LOW POSTIVE	N	N	Y

S.No.	MRD No	Neuropathy	Vasculitis	Skin	ANY OTHER EXTRA ARTUCULAR MANIFESTATION	First visit/follow up	BP (mm of Hg)	HEIGHT (inches)	WEIGHT (kg)	BMI (kg/m^2)	HR (bpm)	PALLOR	DEFORMITY	ICTERUS/CYANOSIS/EDEMA/CLUBBBING	Hb (gm/dl)	TLC (10^3/ul)	PLT COUNT (10^3/ul)	AST (U/l)	ALT (U/l)	CREATININE (mg/dl)	ESR (mm/hour)	CRP (mg/L) (OPTIONAL)
1	860511	N	N	N	N	2	110/70	66	43.7	15.54984744	102	N	Y	N/N/N/N	9.2	7.6	584	23	39	0.73	120	175.15
2	506609	N	N	N	N	2	100/60	63	49	19.13584074	54	Y	N	N/N/N/N	14.5	7.4	494	28	22	0.99	60	NA
3	860418	N	N	N	N	2	120/70	62	65	26.20972984	84	Y	N	N/N/N/N	10.4	7.8	263	38	32	0.8	35	NA
4	843316	N	N	N	N	1	90/70	58	37	17.04819105	80	Y	N	N/N/N/N	9.3	8.7	478	16	7	0.57	120	NA
5	561663	N	N	N	Y -RAYNAUDS	2	140/90	66	70	24.90822245	84	Y	N	N/N/N/P	13.08	5	193	37	42	1	45	NA
6	850610	N	N	N	N	2	110/80	67	78	26.93255554	84	N	N	N/N/N/N	11.7	4	283	12	17	0.79	10	0.3
7	242286	N	N	N	N	2	120/70	60	57.5	24.75699396	96	Y	Y	N/N/N/N	7.5	5.3	192	11	16	NA	33	NA
8	23303	N	N	N	N	1	100/70	63	53	20.69795019	82	Y	N	N/N/N/N	NA	NA	NA	NA	NA	NA	18	NA
9	806805	N	N	N	N	2	120/80	60	63.5	27.34033246	84	Y	Y	N/N/N/N	11.6	13.6	404	22	32	NA	38	32.61
10	663542	N	N	N	N	2	90/70	62	48.7	19.63713605	88	N	N	N/N/N/N	12.1	7.4	191	17	21	1	25	NA
11	830970	Y	N	N	N	2	100/80	65	76	27.88171257	72	Y	N	N/N/N/N	9.9	13.4	332	24	34	0.75	12	NA
12	821594	Y	N	N	N	2	110/80	61	66	27.4926645	92	Y	Y	N/N/N/N	NA	NA	NA	NA	NA	NA	46	NA
13	484602	Y	Y	N	N	2	130/80	60	76.8	33.0667328	84	N	Y	N/N/N/N	NA	NA	NA	NA	NA	NA	33	NA
14	839772	Y	N	N	N	2	170/90	62	62.5	25.20166331	72	Y	Y	N/N/N/N	6.3	11.2	199	23	29	0.79	40	NA
15	139101	N	N	N	N	2	90/70	61	52	21.66088718	84	N	Y	N/N/N/N	7.5	14	335	70	86	0.89	35	NA
16	870189	N	N	N	N	1	140/90	61	75	31.2416642	99	Y	Y	N/N/N/N	12.3	6.5	176	20	22	0.95	64	NA
17	857691	N	N	N	N	2	110/70	60	60	25.833385	84	Y	N	N/N/N/N	11.8	10.1	274	25	32	0.63	14	2.73
18	850699	N	N	N	N	2	120/70	64	57	21.56986736	84	N	Y	N/N/N/N	14	10.58	182	47	39	0.98	22	NA
19	406973	Y	N	N	N	2	110/70	62	54	21.7742371	84	N	N	N/N/N/N	11.8	4.1	NA	19	24	NA	16	NA
20	765246	N	N	M	Y -RAYNAUDS	2	130/80	63	73.1	28.54755017	66	NA	NA	NA	12.6	6.6	266	20	21	NA	24	NA
21	843316	N	N	N	N	2	100/70	58	39	17.96971489	66	Y	N	N/N/N/N	13.7	9.3	409	22	13	0.63	38	NA
22	51241	Y	N	N	N	2	130/80	63	71	27.72744271	95	N	N	N/N/N/N	NA	NA	18	14	NA	NA	18	NA
23	885455	Y	N	N	N	1	110/70	67	75	25.89668802	87	Y	N	N/N/N/N	NA	NA	NA	NA	NA	NA	20	NA
24	684831	Y	Y	N	N	2	160/100	61	55	22.91055375	84	Y	Y	N/N/N/N	9.8	NA	NA	NA	NA	0.91	82	NA
25	835802	N	N	N	N	2	110/70	64	58	21.94828608	84	N	Y	N/N/N/N	11.4	12.2	529	21	27	0.9	70	NA
26	751612	N	N	N	N	2	130/80	64	78	29.5166606	83	Y	Y	N/N/N/N	11	7.4	313	24	29	0.92	16	NA
27	75761	N	N	N	N	2	160/90	62	62	25.00005	84	N	N	N/N/N/N	13.1	11.4	415	17.5	21.6	0.65	11	NA
28	880059	N	N	N	N	2	130/90	63	65	25.38427853	69	Y	N	N/N/N/N	11.3	13.1	254	NA	NA	NA	12	NA
29	689146	N	N	N	N	2	110/80	62	48	19.35487742	90	Y	N	N/N/N/N	NA	NA	NA	NA	NA	NA	20	NA
30	510512	N	N	N	N	2	90/70	59	50	22.26376185	70	N	N	N/N/N/N	10.6	3.8	149	NA	NA	NA	26	NA
31	886804	Y	N	N	N	1	120/80	62	65	26.20972984	84	Y	Y	N/N/N/N	10.1	6.8	152	16	13	0.62	116	10.77
32	886644	Y	Y	N	N	1	130/90	62	44	17.74197097	79	Y	Y	N/N/N/N	12.4	5.8	253	31	31	0.45	30	NA
33	732611	Y	N	N	N	2	150/80	61	79	32.90788629	74	N	Y	N/N/N/N	11.7	8.05	245	38	55	0.8	1	1.04
34	865176	N	N	N	N	2	120/80	63	74	28.89902479	84	Y	N	N/N/N/Y	10.7	9	148	37	43	1	67	NA
35	127515	Y	N	N	N	1	120/80	63	64	24.99375117	84	N	N	N/N/N/N	NA	NA	NA	NA	NA	NA	32	NEGATIVE
36	449710	N	N	N	N	2	120/80	60	56	24.11115933	84	N	Y	N/N/N/N	13	5.7	285	249	154	0.59	4	NA
37	619168	N	N	N	N	2	130/80	62	69	27.82263629	77	N	Y	N/N/N/N	11.6	5.6	158	17	17	0.78	22	NA
38	787901	Y	N	N	N	2	100/60	65	64	23.4793369	84	Y	N	N/N/N/N	10.8	9.7	293	24	22	0.62	16	NA
39	710242	Y	N	N	N	2	130/70	66	60	21.34990496	102	N	Y	N/N/N/N	12.7	7.7	201	21	25	0.81	15	NA

S.No.	MRD No	FULFILLING EULAR CRITERIA	RADAI 5 Q1	RADAI5 Q2	RADAI5 Q3	RADAI5 Q4	RADAI5 Q5	FN (0-10)	PAIN (0-10)	PGA (0-10cm) or ptge	PGA (0-100 mm)	EGA (0-10 cm)	EGA (0-100 mm)	EMS (min)	TJC	SJC	DAS 28	CDAI	RADAI 5	RAPID 3	Any other investigation	Any identified cause of flare
1	860511	Y	8	6	7	7	2	-	-	7	70	6.5	65	120	3	4	6	5.86	20.5	-	URINE R/E-WNL, ALBUMIN=3.08 mg/dl	N
2	506609	Y	8	6	7	8	1	-	-	7.5	75	5.5	55	60	4	2	6	5.43	19	-	N	POST DELIVERY
3	860418	Y	5	10	10	5	1	-	-	6.5	65	5.5	55	40	2	2	6.2	4.59	16	-	ECHO- WNL	N
4	843316	Y	8	10	5	5	5	-	-	5	50	4	40	150	3	1	6.6	5.30	13	-	N	FATIGUE
5	561663	Y	10	5	5	2	1	-	-	2	20	2	20	50	1	0	4.6	3.50	5	-	ANA-NEGATIVE	N
6	850610	Y	7	6	4	9	1	-	-	7	70	5	50	55	3	2	5.4	3.96	17	-	URINE R/E-WNL	N
7	242286	Y	4	0	5	5	1	-	-	4.5	45	2	20	45	0	0	3	3.08	6.5	-	N	N
8	23303	Y	3	1	0	3	0	-	-	3	30	1	10	10	0	1	1.4	2.72	5	-	N	N
9	806805	Y	8	4	3	1	0	-	-	1	10	1	10	10	0	0	3.2	2.69	2	-	ANA (ELISA) 11.3	N
10	663542	Y	6	8	1	0	0	-	-	0	0	0	0	0	0	0	3	2.25	0	-	FERRITIN= 18, TSH = 3.41	N
11	830970	Y	10	5	3	4	1	-	-	4	40	2	20	30	0	1	4.6	2.58	7	-	RBS- 92	N
12	821594	Y	9	8	3	3	0	-	-	4.5	45	4	40	50	3	0	4.6	4.28	11.5	-	N	WINTERS
13	484602	Y	5	4	4	4	1	-	-	4	40	2	20	30	1	0	3.6	3.57	7	-	N	N
14	839772	Y	2	8	7	8	1	-	-	8	80	6	60	45	3	0	5.2	4.67	17	-	N	FATIGUE OR OVEREXERTION
15	139101	Y	10	3	1	1	0	-	-	1	10	1	10	10	0	0	3	2.63	2	-	N	N
16	870189	Y	10	6	9	8	1	-	-	8	80	7	70	60	2	4	6.8	5.38	21	-	N	N
17	857691	Y	5	4	2	2	0	-	-	2	20	10	10	15	0	0	2.6	2.13	12	-	URINE R/E WNL	WINTERS, COLD WATER
18	850699	Y	6	10	5	3	0	-	-	3	30	1.5	15	15	0	0	4.8	2.58	4.5	-	N	N
19	406973	Y	6	7	6	6	1	-	-	6	60	3.5	35	70	0	1	5.2	3.06	10.5	-	N	FATIGUE OR OVEREXERTION, WINTERS
20	765246	Y	3	2	1	1	1	-	-	1	10	1	10	20	0	0	1.6	2.36	2	-	N	N
21	843316	Y	10	8	6	3	5	-	-	4	40	4	40	180	2	1	6.4	4.18	11	-	N	STRESS, WINTERS
22	51241	Y	3	6	1	3	1	-	-	3	30	2	30	40	0	0	2.8	2.44	5	-	N	WINTERS
23	885455	Y	2	0	1	4	1	-	-	4	40	1	10	40	0	0	1.6	2.66	5	-	N	N
24	684831	Y	5	5	6	7	3	-	-	7	70	7.5	70	150	5	2	5.2	5.71	21.5	-	N	WINTERS
25	835802	Y	5	6	8	5	2	-	-	5	50	4	40	120	2	1	5.2	4.75	12	-	N	N
26	751612	Y	9	8	1	5	0	-	-	5	50	3	30	10	2	0	4.6	3.43	10	-	TSH=1.85, ANA 2+:NUCLEAR HOMOGENOUSAND MITOCHONDRIAL TYPE 2, ANA PROFILE NEGATIVE	N
27	75761	Y	2	0	0	0	0	-	-	0	0	0	0	0	0	0	0.4	1.68	0	-	CHOL= 170	N
28	880059	Y	5	5	0	0	0	-	-	0	0	0	0	0	0	1	2	2.02	1	-	N	WINTERS
29	689146	Y	4	2	0	2	0	-	-	2	20	1	10	0	0	1	1.6	2.66	4	-	N	N
30	510512	Y	9	9	1	0	0	-	-	0	0	0	0	0	1	0	3.8	2.84	1	-	N	POST DELIVERY
31	886804	Y	5	6	3	6	0	-	-	7	70	5.5	55	30	4	1	4	5.71	17.5	-	RBS= 114	WINTERS
32	886644	Y	9	9	10	3	0	-	-	3	30	3	30	30	3	0	6.2	3.77	9	-	N	WINTERS
33	732611	Y	3	1	0	2	0	-	-	2	20	0	0	10	0	0	1.2	0.28	2	-	N	N
34	865176	Y	10	10	7	6	0	-	-	6.5	65	5.5	55	30	1	1	6.6	4.69	14	-	URINE R/E- TRACE PROTEIN	N
35	127515	Y	5	6	7	2	1	-	-	2	20	1.5	15	40	1	0	4.2	3.27	4.5	-	N	N
36	449710	Y	2	1	0	0	0	-	-	0	0	0	0	0	0	0	0.6	0.97	0	-	TSH=1.36, USG - WNL, ANTIHCV -NR, HBsAg -NR	SUMMERS
37	619168	Y	7	1	0	0	0	-	-	0.5	5	0	0	10	0	0	1.6	2.23	0.5	-	N	N
38	787901	Y	9	6	1	4	0	-	-	4	40	1	10	10	0	0	4	2.50	5	-	N	N
39	710242	Y	5	5	2	1	0	-	-	1	10	0.5	5	0	0	1	2.6	2.32	2.5	-	ECHO-NORMAL EF, MILD TR	N

S.No.	MRD No	Name Initial	Age (years)	Gender	Date of inclusion	Duration of disease (years)	Education	Smoker	Other co-morbidity	Any other autoimmune disease	History of RA in family	If family history present which member	Erosions	RF	Value of RA Factor if available (IU/ml)	Anti CCP	Value of ANTICCP if available (IU/ml)	Nodules	ILD	SS
40	878090	DK	42	F	30/1/20	0.75	UNEDUCATED	N	N	N	M	N	-	P	84.1	NA	NA	N	N	Y
41	774688	MK	49	F	30/1/20	20	10	N	N	N	N	N	-	P	206	NA	NA	N	N	Y
42	766849	MK	48	F	30/1/20	1	5	N	Y HTN DYSLIPIDEMIA OA	N	N	N	-	P	76	NA	NA	N	N	Y
43	55190	J	62	F	31/1/20	6	5	N	Y HTN	N	Y	MOTHER	-	P	NA	NA	NA	N	N	N
44	877504	JA	30	F	02-08-2020	3	12	N	N	N	Y	MATERNAL GRANDFATHER	-	P	219	P	500	N	N	Y
45	58377	MK	63	F	02-08-2020	30	10	N	N	N	Y	MOTHER	-	P	NA	NA	NA	N	N	Y

S.No.	MRD No	Neuropathy	Vasculitis	Skin	ANY OTHER EXTRA ARTUCULAR MANIFESTATION	First visit/follow up	BP (mm of Hg)	HEIGHT (inches)	WEIGHT (kg)	BMI (kg/m^2)	HR (bpm)	PALLOR	DEFORMITY	ICTERUS/CYANOSIS/EDEMA/CLUBBBING	Hb (gm/dl)	TLC (10^3/ul)	PLT COUNT (10^3/ul)	AST (U/l)	ALT (U/l)	CREATININE (mg/dl)	ESR (mm/hour)	CRP (mg/L) (OPTIONAL)
40	878090	N	N	N	N	2	Dec-80	64	57	21.56986736	88	N	N	N/N/N/N	14.2	11	220	NA	NA	0.7	16	NA
41	774688	Y	N	N	N	2	110/80	60	60	25.833385	100	N	Y	N/N/N/N	9.6	8	355	22	28	0.59	32	NA
42	766849	N	N	N	N	2	150/90	61	70	29.15888659	84	N	Y	N/N/N/N	10.9	10.9	337	67	71	0.97	36	NA
43	55190	N	N	N	N	2	120/80	63	53	20.69795019	84	N	N	N/N/N/N	12.2	6.26	194	12	18	NA	23	NA
44	877504	N	N	N	CARPAL TUNNEL SYNDROME	2	140/70	60	68	29.27783633	84	N	N	N/N/N/N	9.1	11.8	325	11	19	0.41	106	18.01
45	58377	N	N	N	N	2	110/70	60	61	26.26394142	56	Y	Y	N/N/N/N	12.5	7.2	314	31	40	0.6	40	NA

S.No.	MRD No	FULFILLING EULAR CRITERIA	RADAI 5 Q1	RADAI5 Q2	RADAI5 Q3	RADAI5 Q4	RADAI5 Q5	FN (0-10)	PAIN (0-10)	PGA (0-10cm) or ptge	PGA (0-100 mm)	EGA (0-10 cm)	EGA (0-100 mm)	EMS (min)	TJC	SJC	DAS 28	CDAI	RADAI 5	RAPID 3	Any other investigation	Any identified cause of flare
40	878090	Y	2	8	3	1	1	-	-	1	10	1	10	30	0	0	3	2.08	2	-	URIC ACID =4.3	N
41	774688	Y	5	6	6	5	1	-	-	5	50	3	30	40	0	2	4.6	3.52	10	-	N	N
42	766849	Y	6	7	7	5	1	-	-	5	50	3	30	30	1	1	5.2	4.05	10	-	TG=283	N
43	55190	Y	5	6	1	1	0	-	-	1	10	0	0	0	0	0	2.6	2.33	1	-	N	N
44	877504	Y	10	10	6	5	3	-	-	5	50	4	40	150	6	4	6.8	5.90	19	-	URINE R/E- 2-3 RBCs/HPF	FATIGUE OR OVEREXERTION
45	58377	Y	5	5	4	3	5	-	-	4	40	3	30	160	1	2	4.4	4.10	10	-	N	N

RWS
Life Sciences

RAPID-3
LICENSE AGREEMENT

Contact Name	Ravreet Pal Kaur
Address	Department of Medicine Dayanand Medical College and Hospital Ludhiana, Punjab, India
Phone Number	7009329937
Email Address	ravreet264@gmail.com
Study ID	N/A
Study Title or Project Description	Comparison of various disease activity indices in rheumatoid arthritis
Number of Patients Enrolled	200~300
Number of Rheumatologists who will utilize the MDHAQ/RAPID3/MHAQ	2
Mode of Administration (Paper,. Electronic, Web)	Paper
Study Start/End Dates (or Duration of the Project)	Sep 2019 ~ June 2022
Translations Needed	None (English only); Questions to be read aloud to patients in Punjabi if required.
License Fee	Waived for non-commercial use

RWS
Life Sciences

On behalf of Dr. Theodore Pincus, the copyright holder of the RAPID-3, RWS Life Sciences grants User the right to use and reproduce the Scale for use in the study described on page 1 as specified on page one of this agreement and is subject to the terms and conditions of this license agreement:

1. Modification

User shall not modify, abridge, condense, adapt, recast or transform the RAPID-3 in any manner or form, including but not limited to any minor or significant change in wordings or organization of the RAPID-3 without the prior written agreement of Dr. Theodore Pincus, copyright holder of the RAPID-3.

2. Translation

User shall not translate the RAPID-3 without the prior written agreement RWS Life Sciences For any new translation of the RAPID-3 a translation agreement shall be signed with RWS Life Sciences

3. Reproduction

User shall not reproduce the RAPID-3 except for the use specified on page one of this license agreement. In no event shall User distribute copies of the RAPID-3 by any means to third parties except those specifically involved in the covered program identified on page one of this license agreement.

4. Publication

A copy of all published papers and abstracts using the RAPID-3 shall be provided to RWS Life Sciences in order to document the use of this instrument. All publications or presentations created by User shall cite:

- Pincus, T., (2008), RAPID3 (Routine Assessment of Patient Index Data 3), a rheumatoid arthritis index without formal joint counts for routine care: proposed severity categories compared to disease activity score and clinical disease activity index categories. *J Rheumatol.* 2008 Nov;35(11):2136-47. Epub 2008 Sep 15.

User shall not include a copy of the RAPID-3 (original and/or any of its translations) in any publication.

5. Fees

5.1. License fee:

The RAPID-3 is made available at no charge to all researchers involved in non-commercial clinical studies. Use of the RAPID-3 for the commercial purpose specified on page one of this license agreement will be subject to royalty fees in the amount of $0.00 USD.

RWS
Life Sciences

6. Copyright

It is understood that Dr. Theodore Pincus, the copyright holder of the RAPID-3, holds the copyright of both the RAPID-3 and all its existing and future translations.

To avoid any copyright infringement, a copyright notice shall be included on the original Questionnaire and all its translations as follows: RAPID-3 © 2005/2008/1983 - All rights reserved.

7. Confidentiality

Any and all information related to the RAPID-3 including but not limited to the following: information concerning clinical investigations, creations, systems, materials, software, data, know-how, translations, improvements ideas, specifications, documents, records, notebooks, drawings, and any repositories or representation of such information, whether oral or in writing or software stored, are herein referred to as confidential information.

In consideration of the disclosure of such confidential information to the other, each party agrees to hold such information in confidence and not divulge it, in whole or in part, to any third party except for the purpose specified in this license agreement.

8. Use of Name

It is agreed that RWS Life Sciences shall not disclose the name of User to any third party, except the copyright holder of the RAPID-3, Dr. Theodore Pincus, whether through the press or otherwise.

9. Copy to the Author

It is understood that a copy of this User license agreement will be provided to Dr. Theodore Pincus.

10. Termination

This license agreement remains in full force and effect until the expiration date specified on page one of this license agreement. User's rights under this license agreement will terminate automatically without notice if User fails to comply with any term(s) of this license agreement. Upon termination of this license agreement, User will cease all use of the RAPID-3. Except for the license granted herein (which shall terminate) and except as expressly provided otherwise herein, the terms of this license agreement will survive termination.

11. Assignment

This license agreement and any of the rights and obligations of the User are specific to the User and cannot be assigned or transferred by User to any third party or by operation of law, except with the express written consent of RWS Life Sciences

RWS
Life Sciences

12. Separate license agreement

This license agreement is in force for the use specified on page one of this agreement only. The use of the RAPID-3 by the User for any other purpose will require a separate license agreement.

13. Governing Law

This license agreement shall be governed by the laws of the State of Connecticut. You agree to submit to the exclusive jurisdiction and venue of the State and/or Federal Courts of the district of Connecticut with respect to any suit arising out of or relating to this license agreement.

14. Miscellaneous

If, for any reason a court of competent jurisdiction finds any provision, or portion thereof, to be unenforceable, the remainder of this license agreement shall continue in full force and effect. The waiver by either party of any default or breach of this license agreement will not constitute a waiver of any other subsequent default or breach. Except as expressly provided for in this license agreement, you may not assign, sell, transfer, delegate or otherwise dispose of, whether voluntarily or involuntarily, by operation of law or otherwise, this license agreement or any rights or obligations under this license agreement. Any purported assignment, transfer or delegation by you except as expressly provided for in this license agreement will be null and void. This license agreement constitutes the entire agreement between the parties with respect to the subject matter herein and supersedes all prior or contemporaneous agreements or representations, written or oral, concerning such subject matter. No amendment to or modification of this license agreement will be binding unless in writing and signed by a duly authorized representative of each party.

DISCLAIMER OF WARRANTY

YOU EXPRESSLY ACKNOWLEDGE AND AGREE THAT USE OF THE RAPID-3 IS AT YOUR SOLE RISK. THIS RAPID-3 IS PROVIDED "AS IS" AND WITHOUT WARRANTY OF ANY KIND AND THE VENDOR AND ITS SUPPLIERS EXPRESSLY DISCLAIM ALL WARRANTIES AND/OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES AND/OR CONDITIONS OF TITLE, NON-INFRINGEMENT OF THIRD PARTY RIGHTS, MERCHANTABILITY OR SATISFACTORY QUALITY AND FITNESS FOR A PARTICULAR PURPOSE. THE VENDOR DOES NOT WARRANT THAT THE RAPID-3 WILL MEET YOUR REQUIREMENTS OR THAT DEFECTS IN THE RAPID-3 WILL BE CORRECTED. FURTHERMORE, THE VENDOR DOES NOT WARRANT OR MAKE ANY REPRESENTATIONS REGARDING THE USE OR THE RESULTS OF THE USE OF THE RAPID-3 OR DOCUMENTATION IN TERMS OF THEIR CORRECTNESS, ACCURACY, RELIABILITY, OR OTHERWISE. NO ORAL OR WRITTEN

RWS
Life Sciences

INFORMATION OR ADVICE GIVEN BY THE VENDOR OR ANY AUTHORIZED REPRESENTATIVE SHALL CREATE A WARRANTY. SHOULD THE RAPID-3 PROVE DEFECTIVE, YOU (AND NOT THE COMPANY OR ANY AUTHORIZED REPRESENTATIVE) ASSUME THE ENTIRE COST OF ALL NECESSARY CORRECTION. SOME JURISDICTIONS DO NOT ALLOW THE DISCLAIMER OF IMPLIED WARRANTIES, SO THE DISCLAIMER OF IMPLIED WARRANTIES ABOVE MAY NOT APPLY TO YOU, IN WHICH CASE THE DURATION OF ANY SUCH IMPLIED WARRANTIES IS LIMITED TO SIXTY (60) DAYS FROM THE DATE YOU FIRST ACCESSED THE RAPID-3; PROVIDED, HOWEVER, THAT YOUR SOLE AND EXCLUSIVE REMEDY AND VENDOR'S SOLE OBLIGATION SHALL IN ANY CASE BE THAT VENDOR WILL, AT ITS OPTION TERMINATE THIS AGREEMENT AND REFUND AMOUNTS ALREADY PAID THEREFORE BY YOU.

LIMITATION OF LIABILITY

REGARDLESS OF WHETHER ANY REMEDY SET FORTH HEREIN FAILS OF ITS ESSENTIAL PURPOSE OR OTHERWISE, TO THE EXTENT PERMITTED BY LAW, VENDOR ITS SUPPLIERS WILL NOT BE LIABLE FOR ANY INDIRECT, EXEMPLARY, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES OF ANY CHARACTER, INCLUDING BUT NOT LIMITED TO DAMAGES FOR LOSS OF INFORMATION, LOST PROFITS AND BUSINESS INTERRUPTION, AND THE COST TO OBTAIN SUBSTITUTE SERVICES, ARISING IN ANY WAY OUT OF THIS AGREEMENT OR THE USE OF (OR INABILITY TO USE) THE RAPID-3 HOWEVER CAUSED AND WHETHER ARISING UNDER A THEORY OF CONTRACT, TORT OR ANY OTHER LEGAL THEORY, EVEN IF VENDOR OR ITS SUPPLIERS WERE ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. SOME JURISDICTIONS DO NOT ALLOW THE LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES SO THIS LIMITATION MAY NOT APPLY TO YOU. IN NO EVENT SHALL THE VENDOR'S TOTAL LIABILITY TO YOU EXCEED THE AMOUNT PAID BY YOU HEREUNDER.

LICENSOR

By: RWS Life Sciences

Name: Amanda Rosett

Title: Lead Licensing Coordinator

Signature: _____

Date: _____

LICENSEE

By: RAVREET PAL KAUR

Name: RAVREET PAL KAUR

Title: PG RESIDENT (MEDICINE)

Signature: Ravneet Pal Kaur

Date: 25th Sep, 2019